

HARVARD UNIVERSITY

ROBERT AND RENÉE BELFER
CENTER FOR SCIENCE AND INTERNATIONAL AFFAIRS

2000-2001

ANNUAL REPORT

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Director's Foreword

For the hub of the John F. Kennedy School's research, teaching, and training in international security affairs, environmental and resource issues, conflict prevention and resolution, and science and technology policy, the first academic year of the new century has been bracing. According to our mission statement, The Belfer Center for Science and International Affairs strives to provide leadership in advancing policy-relevant knowledge about the most important challenges of international security and other critical issues where science, technology, and international affairs intersect.

BCSIA's leadership begins with the recognition of science and technology as driving forces transforming threats and opportunities in international affairs. The Center integrates insights of social scientists, technologists, and practitioners with experience in government, diplomacy, the military, and business to address critical issues.

BCSIA involvement in both the Republican and Democratic campaigns.

BCSIA was privileged to have senior advisors in both camps in one of the most unforgettable American elections in recent memory. Four of our BCSIA colleagues were called immediately into service in the Bush Administration. Robert Zoellick was tapped as the U.S. Trade Representative. Bob Blackwill was enlisted as America's ambassador to India. Jendayi Frazer and Rich Falkenrath accepted posts on the National Security Council staff. Evan Feigenbaum was later chosen for the Policy Planning staff at the Department of State.

Center establishes new International Council chaired by James Schlesinger.

To strengthen our links to the world of policy relevant knowledge, BCSIA has now created an International Council of distinguished representatives from the US and abroad. Among those now actively contributing to BCSIA's research agenda are former Federal Reserve Chairman Paul Volcker, Minos Zombanakis, Don Kendall, Frank Stanton, H.E. Sheikh Mohammed Abalkhail, and a number of distinguished world citizens. The Center is clearly benefiting from their insights and suggestions, and we hope by sharing our current work with this group we can provide good value for both them and our core research academics.

Continued leadership in policy-relevant academic research.

As always, we take special pride in the people who made BCSIA the premier policy-relevant research institution in America's finest university. John Holdren continued to garner honors with the Heinz Award for Public Policy recognition, while Lewis Branscomb received the prestigious National Science Board Vannevar Bush Award. The seventy doctoral and post-doctoral fellows in residence continue establishing their individual marks of excellence in each of our five research programs.

Service to the wider university community and beyond.

BCSIA continues to be a leader in support of conferences, prominent guest speakers, and university-wide activities. During the past year high-level conferences were hosted by BCSIA on European Security with representatives of a dozen major European nations, on Caspian Basin security issues with leaders from that region, and on ballistic missile defense with leaders of government, industry and academia. Distinguished speakers at the KSG Forum sponsored by BCSIA included Robert McNamara, SEN John Glenn, SEN Chuck Hagel, and George Soros. For the university-wide Harvard Colloquium on International Affairs BCSIA brought in security experts from China and Russia.

Outreach through publications.

During the academic year, members of BCSIA wrote, edited, or contributed chapters to more than 40 published books. They generated more than 30 discussion papers and contributed hundreds of articles to newspapers and journals, as well as continued the successful publication of the highly regarded International Security. A full listing of the publications from the Center can be found in the Publications section of this report.

This annual report is rich in detail regarding the exceptional work done collectively and individually by the 150 scholars at work in BCSIA. I encourage you to read the report in detail for a comprehensive assessment of the past year. For the present and the future of BCSIA I invite you, as always, to frequently log on to our web page at www.ksg.harvard.edu/bcsia. We are eager to hear from you about ideas for strengthening our programs and our support to the policy community.

- *Graham T. Allison*
Cambridge, Massachusetts

Overview

from the Executive Director

The academic year of 2000-2001 was unique in the range of policy issues tied to an American election and a world in transition. BCSIA was unique in its effort to deal with these issues through solid, wide-ranging, policy oriented research that contributed much to inform our people and our leaders.

Bill Clark concluded his exceptional five-year Global Environmental Assessment with a string of well-received publications capturing the contributions of more than 30 doctoral and post-doctoral fellows involved in his project. With the work of other colleagues in the Environmental and Natural Resources Program, this resulted in a series of specific and achievable recommendations for limiting carbon emissions in the developing economies of Russia, China, and India.

The Program for Intrastate Conflict, Conflict Prevention, and Conflict Resolution continued to deal with the special challenges of the spread of “small wars” with huge consequences. More than 7 million people in dozens of states from Kosovo to Congo lost their lives to these conflicts in the 1990’s and the search for mechanisms to control this violence has become a centerpiece of international security. Gaining new prominence is the challenge of defining and dealing with “failed states” which have the most serious implications for all other nations.

Our Strengthening Democratic Institutions Project continued to both monitor the evolution of democracy in the former Soviet Union and to seek to make positive contributions through local programs that build political parties and the other institutions necessary for the sustainment of democracies.

As with every change of administration in American politics, BCSIA viewed this transition during the past year as an opportunity to once again review our policies in place and to think outside the box on new opportunities that are emerging where our research and scholarship can contribute in specific ways to the development of national policy.

BCSIA accepted the challenges of the past year to assemble experts from around the world on issues as far-ranging as the new security challenges facing Europe, to halting the sale and distribution of small arms in the developing world, and the energy opportunities in the Caspian basin. Each session was focused back to the needs of the policy community on our highest priority needs.

- John Reppert
Cambridge, Massachusetts

Environment and Natural Resources Program

MEMBERS

FACULTY

Robert Stavins, Faculty Chair, ENRP; Albert Pratt Professor of Business and Government
Henry Lee, Jaidah Family Director of the Environment and Natural Resources Program; Lecturer in Public Policy
William Clark, Harvey Brooks Professor of International Science, Public Policy and Human Development;
Director, Global Environmental Assessment Project (GEA) and Research and Assessment Systems for
Sustainability (SUST)
Cary Coglianese, Associate Professor of Public Policy
William Hogan, Lucius N. Littauer Professor of International Political Economy
John Holdren, Teresa and John Heinz Professor of Environmental Policy; Program Director and Faculty Chair,
Science, Technology, and Public Policy Program
Sheila Jasanoff, Professor of Science and Public Policy
Joseph Kalt, Ford Foundation Professor of International Political Economy
Theodore Panayotou, Fellow, Harvard Institute for International Development
Edward Parson, Associate Professor of Public Policy
Philip Sharp, Lecturer in Public Policy

STEERING COMMITTEE

Carter Bales, Director and Senior Partner, McKinsey and Company
Stanley Charren, former Chairman, Kennetech, Inc.
Charles Curtis, Partner, Hogan & Hartson
Mitchell Dong, President, Chronos Asset Management
Mary Gade, Attorney, Sonnenschein, Nath & Rosenthal and former Chair, Illinois EPA
William Haney, ENRP Senior Fellow, BCSIA, and former Chair, Molten Metal
Teresa Heinz, Chair, Heinz Family Endowments
Harold Hestnes, Senior Partner, Hale and Dorr
Frederic Krupp, Executive Director, Environmental Defense Fund
William Reilly, former Administrator, U.S. Environmental Protection Agency
Ellen Roy, Managing Director, I-Group LLC
Andrew Savitz, Director, Environmental Advisory Services, PriceWaterhouse,Coopers
Cathleen Douglas Stone, IOP '84 – former Chief of Environmental Services in Boston, MA
Donald Smith, President, Smith Cogeneration
Timothy Wirth, President, the United Nations Foundation

VISITING SCHOLARS

Robert Kates, Professor Emeritus, Brown University and Visiting Scholar, ENRP
Rasmus Rasmusson, Visiting Scholar, ENRP

SENIOR RESEARCH FELLOWS

Robert Corell, Senior Research Fellow, GEA & SUST
Charles H. W. Foster, Senior Fellow and Adjunct Lecturer, ENRP

Robert Frosch, Senior Research Fellow, SUST
Mary Graham, Joint Fellow ENRP and Taubman Center for State and Local Government
William Haney, Fellow, ENRP
Cheryl Holdren, Senior Research Fellow, ENRP

SENIOR RESEARCH ASSOCIATE

Nancy Dickson, Senior Research Associate, GEA & SUST

ASSOCIATE RESEARCH DIRECTOR

Karen Filipovich, Research Fellow and Associate Research Director, ENRP

FELLOWS

Frank Alcock, Fellow, GEA
David Cash, Fellow, SUST
Sheila Cavanagh, Ph.D. candidate, KSG, Fellow ENRP
Aarti Gupta, Fellow, GEA
Bernd Kasemir, Fellow, GEA
Myanna Lahsen, Fellow, GEA
Marybeth Long, Fellow, GEA
Laszlo Pinter, Fellow, SUST
Bernd Siebenhuener, Fellow, GEA

PRE-DOCTORAL FELLOWS

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Ruben Lubowksi, Ph.D. candidate, Kennedy School of Government
Alix Peterson Zwane, Ph.D. candidate, Kennedy School of Government
Lori Snyder, Ph.D. candidate, Kennedy School of Government
Edmond Toy, Ph.D. candidate, Kennedy School of Government

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Roger Kasperson, SUST Associate, Executive Director, Stockholm Environment Institute
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THOMAS WILBANKS, SUST ASSOCIATE, CORPORATE RESEARCH FELLOW, OAK RIDGE NATIONAL LABORATORY

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BACKGROUND

The Environment and Natural Resources Program (ENRP) continues to be the school's largest environmental research and outreach program dedicated to exploring the major policy issues facing decision makers around the world. The goal of the program has been to contribute to the public policy debate both in the United States and abroad. A major element of ENRP's strength is the faculty members who are affiliated and who continue to be intimately involved in the design, development, and assessment of environment and natural resources policy at the highest levels of government and business.

Professor Robert Stavins, the faculty chair, continued to chair EPA's Environmental Economics Advisory Committee and has been intimately involved in restructuring and rebuilding the agency's analytic capability. Professor Stavins was an active member of the Intergovernmental Panel on Climate Change Working Group on Policy Responses. John Holdren has been actively involved in the National Academy of Sciences projects on Indian and Chinese energy policy and was this year's recipient of the prestigious Heinz Award for Public Policy. Bill Clark continued his work as the Chair of the Heinz Center's work on developing the National Report Card. Sheila Jasanoff served on the Committee of Visitors for the National Science Foundation's program on the Societal Dimensions of Engineering, Science, and Technology. Lewis Branscomb received the Vannevar Bush award for lifetime achievement in science and public service and Calestous Juma was awarded the Henry Shaw Prize, which is the highest award given by the Missouri Botanical Gardens. In 1998, Pennsylvania, New Jersey, and Maryland implemented the electricity transmission pricing plan developed and advocated by Bill Hogan.

Today, the consensus in the United States, as enunciated by the Federal Energy Regulatory Commission, is that this plan is the model that should be adapted by other regions.

RESEARCH

ENRP's research agenda focuses on many of the relevant policy questions confronting our society: global climate change, developing the next generation of energy technologies, the use of market incentives to realize environmental policy goals for designing and achieving a sustainable environment, and electricity restructuring. In 2000-2001, our climate change research continued to focus on greenhouse gas reduction schemes for the major developing countries of Russia, China, and India. Reports on the potential of carbon reduction in Russia's electricity sector and on China's energy R&D programs were produced, the latter as part of the Energy Innovation Project, a joint ENRP-STPP effort. Work continued on switching the U.S. electric generating fleet from coal to natural gas and new research was initiated on distributive electric technologies.

The Global Environmental Assessment (GEA) program, one of the Center's major initiatives over the past five years, came to an end. Over thirty doctoral and post-doctoral students participated in this intensive effort that deepened our critical understanding of the relationships between research, assessment, and management in the global environmental arena. Using the GEA program as a launching pad, the ENRP has initiated a major new program aimed at developing frameworks and approaches for the regional study of multiple, cumulative, interactive stress effects of global environmental changes along multiple time scales.

ENRP also supported work on the effectiveness of environmental management systems, civic environmentalism, alternative policy instruments for managing urban water supplies, ozone depletion, and the implication of information technology on energy systems.

The ENRP faculty continues to manage two of the school's most successful executive programs – Economics and the Environment: A Course for the Non-Economist and Infrastructure in a Market Economy (IME). Enrollment in the former has doubled, while the IME program has evolved into one of the world's premier training programs attracting participants from over 35 countries. New case studies were completed on the California electricity crisis, Germany's electricity regulator programs and Britain's water system.

Papers produce by ENRP researchers are distributed widely to government officials and leaders from business, academia and NGOs. In 2000-2001, ENRP disseminated more than 20 new research papers.

OUTREACH

The Roy Summer Intern Program entered its second year. Applications increased two-fold and their quality exceeded our expectations. Three fellowships were awarded. The first to work with the Policy Research Center of the State Environmental Protection Administration in Beijing, China on air pollution policy, the second to assist the United Nations Development Programme

in Bhutan with sustainable development of horticulture potentials, and the third to work with the African Centre for Technology Studies on evaluating the feasibility of land-based agriculture in the Lake Victoria region of Kenya.

The ENRP co-sponsored several workshops. In October, it convened the first meeting between Russian officials, including several Duma members and U.S. officials from the public and private sectors to discuss the feasibility of instituting an international carbon trading program that involved Russia. In early May, the ENRP co-sponsored a two-day workshop on Voluntary, Collaborative and Information-based Policies. This session explored the success and failure of voluntary programs to enhance the environment. Finally, in late May, the ENRP together with the Center for Business and Government and the New Environmental Economics Program, held a workshop in Washington DC on the use of science and economics in establishing federal environmental standards. Rapporteur's reports are available for these sessions.

In addition, the ENRP sponsored an on-going seminar on green buildings to look at the opportunities and obstacles to design more environmentally sensitive buildings. These sessions were well-attended by architects, university officials, and faculty and students from the School of Public Health, the Kennedy School, and the Design School. Finally, the ENRP co-sponsored with MIT a spring seminar on civic environmentalism.

In 2000-2001, various environment and natural resources events included: a lecture by Carol Browner, former Administrator of the United States Environmental Protection Agency; a seminar series on the issues surrounding Green Building, featuring two forum addresses – the first by William McDonough, architect and Time Magazine's 1999 Hero of the Planet, the second by Ray Anderson, CEO of Interface; a seminar on ozone and ownership with Rasmus Rasumusson, Member of the Executive Committee of the Multilateral Fund for the Montreal Protocol; and a BCSIA Director's lunch with William Richardson, former Secretary of Energy. The University Committee on the Environment, along with ENRP, hosted a distinguished environmental public lecture by James Gustave Speth, Dean of the Yale School of Forestry, in honor of the 100th anniversary of the Yale School of Forestry.

ENRP's work in 2000-2001 was sponsored by the following organizations: the U.S. Environmental Protection Agency (U.S. EPA); the U.S. Department of Energy; the National Science Foundation; the National Institute for Global Environmental Change; the Jaidah Family Endowment; the Roy Family Fund; the Crump Family Fund; the Shell Oil Foundation; AMOCO; the Inter-American Development Bank; the Ford Motor Company; the Energy Foundation; the RAND Corporation; the National Renewable Energy Laboratory; and the Heinz Foundation. Endowment support was received from the Roy Family Fund, which generously assists the creation of an annual lectureship on public and private partnerships for the environment, a visiting fellow, and a special fund to support new research initiatives.

RESEARCH AGENDA AND POLICY OUTREACH

Research in 2000-2001 focused on the following main issue areas:

- I. Climate Change Research**, a multifaceted effort sponsored by the U.S. EPA to analyze means to reduce greenhouse gas emissions, nationally and globally, through market incentives and international research and development implementation.
- II. Global Environmental Assessment Project**, a five-year international collaborative program of interdisciplinary research and training. The project explores how assessment activities can better link scientific understanding with the progressive design, implementation, and evaluation of effective policy responses to global environmental change.
- III. Market-Based Environmental Policy**, which examines innovative, market-based instruments for implementing cost-effective means to meet environmental standards.
- IV. Executive Training Initiatives**, two training programs designed by ENRP to introduce economics to the non-economist and to teach government officials and business leaders from developing countries how to privatize and manage infrastructure effectively.
- V. Science and Technology for Sustainability**, seeks to foster the design and evaluation of strategies with which the next generation of national and international global environmental change programs might more effectively integrate and support its research, assessment and decision-support activities.

In addition, ENRP researchers have been integrally involved in an STPP research project to design and assess policies and programs to develop and design new energy technologies for a world constrained by the threat of climate change. This program focuses on energy research and development programs in India and China, opportunities to improve and expand these programs and options for implementing these opportunities.

A description of specific initiatives for 2000-2001 within each research area follows.

I. CLIMATE CHANGE RESEARCH

Faculty in the Environment and Natural Resources Program at the Kennedy School have been actively involved in the climate change debate for the past twelve years. Bill Clark was one of the primary participants in the Villach Conference in the mid-80s – the findings from which had a major influence on both the policy and the science of this topic. In 1989, the School initiated a major program, the Harvard Global Environmental Policy Project, to explore policy responses and negotiation strategies for reducing carbon emissions. This work was linked to preparatory discussions at both the domestic and international levels leading up to the Rio Summit in 1992. A compendium of a portion of this work was published in 1994 – *Shaping National Responses to Climate Change: A Post-Rio Guide*.

In 1996-97, the School once again dramatically increased its research on the topic of climate change, driven in part by the Kyoto conference held in December 1997. Approximately eight faculty members and 12 doctoral level researchers became involved in a number of major

research projects, some within Harvard and others – such as John Holdren’s report on Energy RD&D in a Greenhouse Constrained World done for the President’s Committee of Advisors on Science and Technology (PCAST) – outside Harvard.

In the past year, KSG faculty continued to be involved in major activities outside the School. Rob Stavins was actively involved in the Intergovernmental Panel on Climate Change’s Workshop Group III. John Holdren chaired the U.S. contingent of the National Academies of Science project on India. Dale Jorgenson continued his groundbreaking work on the economic impacts of greenhouse gas emission reductions in China. Ted Parson was one of the key authors in the U.S. National Assessment of the impacts of climate change. Henry Lee and Rob Stavins were both authors of the forthcoming book by the Pew Center for Climate Change.

Our research built on the successful products of the past three years and continued to emphasize international issues.

International Permit Trading

Virtually all design studies and many projections of the costs of meeting the Kyoto targets have assumed that an international greenhouse gas trading program can be established that will minimize the costs of meeting the treaty’s goals. Prof. Robert Stavins and Research Associate Robert Hahn have continued to raise doubts that such a trading regime will be easy to implement.

They point out that costs can be minimized if all countries use domestic tradable permit systems to meet their national targets and allow for international trades. But this is an unlikely outcome. Instead some countries will use non-trading approaches, such as carbon or greenhouse gas taxes or fixed quantity standards. Establishing an international trading regime will require some form of project-by-project credit program, and such a program will significantly raise transaction costs.

Finally the authors point out that there is an important trade-off between the degree of foreign sovereignty and the degree of cost effectiveness. If individual nations are allowed to choose their own domestic reduction options then those choices may limit the cost-saving potential of an international trading regime.

Their earlier work continues to be influential, with invited presentations having been made by Stavins at a number of important international forums.

Energy R&D in China and India

In 1998 and 1999, researchers from the Belfer Center for Science and International Affairs worked with the President’s Committee of Advisors on Science and Technology to produce a major report, *Powerful Partnerships: The Federal Role in International Cooperation on Energy Innovation*. This effort, chaired by John Holdren, put forth a blueprint for developing energy technology options in a world constrained by climate change.

In the past year, the program – a joint effort between ENRP and STPP – has focused its attention on India and China. Our initial research explored how each country develops research and development priorities in the energy area. Where in the government are policies developed? How are priorities reached? What is the status of programs in areas such as clean coal, nuclear, renewables, and energy efficiency technology? Draft reports for both India and China have been developed and are now being circulated for comment.

The program has been greatly enhanced by our ability to attract an unusually talented group of senior researchers. Dr. Vicki Norberg-Bohm, formerly on the faculty at MIT, coordinates both of these efforts. Our India program is greatly enhanced by the arrival of Adinarayantampi Gopalakrishnan, formerly the Director of the Engineering Staff College of India, and our China program has benefited immensely by the presence of Xu Jing, who has been at the Ministry of Science and Technology (MOST) in Beijing, China, in various positions since 1994. He is currently the Director of the Division of Energy and Transportation, managing the Department of High-Tech Development and Industrialization, and program planning in the fields of energy and transportation.

In the forthcoming year, researchers will focus their attention on transportation and coal policies and, more specifically, both the decision and implementation processes used to meet preset goals. How does scientific and economic information on technological options enter into programmatic decisions? How can these processes be improved? What is the role of partnerships between the public and private sectors? Are there changes that should be made in the rules governing the transfer of technology between the U.S. and China and India?

CARBON TRADING IN RUSSIA

Realizing that Russia was in a position to play a major role in any international regime that emphasizes the use of “flexible mechanisms,” such as greenhouse gas trading or joint implementation, the U.S. Environmental Protection Agency asked the Kennedy School to assess the potential for Russian involvement. Under the direction of Henry Lee, the school pursued three projects: 1) A workshop held in October 2000 that brought together officials from the Russian Duma, the Russian energy sector, and specifically its electricity company and U.S. officials from the public and private sector; 2) A study of the possibility of a carbon trading or JI program in the electricity sector; and 3) A companion assessment of the economic and institutional potential of carbon sequestration and the Russian forestry sector.

The October workshop was the first time key members of the Duma had been exposed to many of the key policy issues surrounding an international carbon regime. A report summarizing the workshop is available from the BCSIA’s Environment and Natural Resources Program.

The study of the Russian electricity sector is complete. Its principal conclusion is that without significant structural, regulatory, and financial reform, foreign private investors will be reluctant to participate in either a carbon trading or a JI program. The final report assesses the condition of the sector in some depth and includes a case study of the electricity sector in Russia’s Far East region.

The sequestration issue was divided into two studies: the first on economics, which was completed in 2000, and the second on institutional issues, which will be available in August 2001.

Carbon Sequestration in the United States

Increased attention by policy makers to the threat of global climate change has brought with it considerable interest in the possibility of encouraging the expansion of forest area as a means of sequestering carbon dioxide. The marginal costs of carbon sequestration or, equivalently, the carbon sequestration supply function, will determine the ultimate effects and desirability of policies aimed at enhancing carbon uptake. In particular, marginal sequestration costs are the critical statistic for identifying a cost-effective policy mix to mitigate net carbon dioxide emissions.

Building upon previous econometric analysis and simulation modeling (Stavins 1999a; Newell and Stavins 1999), Professor Robert Stavins is currently engaged in a new econometric/simulation research project (Stavins 1999b), in collaboration with Andrew Plantinga of Oregon State University, and Ruben Lubowski, a Ph.D. student in Political Economy and Government at Harvard. This work is supported by a three-year grant from the U.S. Department of Energy. In addition, Stavins is engaged in a related two-year project for the Pew Center on Global Climate Change, which frames the carbon sequestration analysis within the larger subject of global climate change policy, describes the analysis and its results, and highlights the implications of this work for public policy and for ongoing research by economists and others.

In the new project, an econometric analysis of land use in the forty-eight contiguous United States will be carried out and the results employed to estimate the carbon sequestration supply function. By estimating the opportunity costs of land on the basis of econometric evidence of landowners' actual behavior, this approach circumvents many of the shortcomings of previous sequestration cost assessments. By conducting the first nationwide econometric estimation of sequestration costs, endogenizing prices for land-based commodities, and estimating land-use transition probabilities in a framework that explicitly considers the range of land-use alternatives, this study will provide the best available estimates of the true costs of large-scale carbon sequestration efforts. In this way, it will add significantly to public understanding of the costs and potential of this important strategy for addressing the threat of global climate change. The analytical framework was presented at the annual meeting of the Allied Social Sciences Associations in New Orleans in January 2001.

In 1999, a one-day workshop was held at the Kennedy School and sponsored by ENRP of researchers from across the United States who are currently engaged in projects that are analyzing the costs of biological carbon sequestration. Discussions are underway for participating in future meetings to help develop common approaches to estimating carbon sequestration costs.

II. GLOBAL ENVIRONMENTAL ASSESSMENT PROJECT

The Global Environmental Assessment Project is a multi-year effort to shape an integrated understanding of the actual relationships among science, assessment, policy and management in social responses to global environmental change. The Project, conducted under the auspices of the University Committee on the Environment and based at the Belfer Center, has drawn on faculty and students from the natural sciences, social sciences and professional schools. Leadership at the Center this year has been provided by Bill Clark, Sheila Jasanoff, Robert Frosch and Nancy Dickson. The Project has also included substantial contributions from the International Human Dimensions Programme on Global Environmental Change, Duke University, University of Oregon, the European Environment Agency and Carnegie Mellon University. The Project's outreach activities have involved substantial participation from scholars and practitioners of global environmental assessment around the world.

The Project is explicitly global in scope, seeking to understand the special problems, challenges and opportunities that arise in efforts to develop common scientific assessments that are relevant and credible across multiple national circumstances and political cultures. We view global environmental change broadly, as it is conceived by efforts such as the international Global Environmental Change Research Programs and Agenda 21. The project has focused on assessment experience in global climate change and variability, ENSO forecasting, stratospheric ozone depletion, air pollution (acid rain and persistent organic pollutants (POPS)), hazardous chemicals and pesticides, biotechnology and biodiversity, and marine fisheries and conservation with special attention to North America, Europe, India and Africa. A long-term perspective focused on the interactions of science, assessment and management over periods of a decade or more rather than concentrating on specific studies or negotiating sessions has been adopted.

To help build a next generation of professionals trained in and sensitive to the unique problems of linking science and policy on global environmental problems, the GEA Project has included as active fellows program. By the end of this year we will have graduated 37 fellows from 11 disciplines and from eight nations, with each fellow producing one or more research papers (these are available on the project web site at <http://environment.harvard.edu/gea>. This year, 6 fellows were recruited to join the project this year. Recruitment takes place through an international competition open to natural and social scientists as well as professional school students. A unique aspect of the GEA Project is its commitment to bringing together a critical mass of young scholars from different disciplines and nationalities in order that they can learn from and collaborate with one another at a formative stage in their careers. A network of alumni fellows is maintained by the project to encourage continuing collaboration.

The Global Environmental Assessment Project will conclude in 2001. Three books summarizing the Project's findings are now being prepared:

The Design of Environmental Assessment Processes: Global and Regional Cases
(Jill Jäger and Alex Farrell eds.)

This book presents a framework for thinking about the environmental assessment process and a set of case studies from which lessons can be drawn about how to design and operate a successful assessment. It is written for practitioners, those who may be asked to participate in an assessment, or to manage one, those who think an environmental assessment is needed and want to understand how to start one up, or those who want to use the results of an assessment. Thus, it focuses on the design of assessments, that is, choices that participants in an assessment

face, or in some cases may be stuck with, of how to organize, and run an assessment, and the implications of those choices.

The Influence of Environmental Assessments: Information, Institutions and Impacts
(William C. Clark, Ronald Mitchell, David Cash and Frank Alcock, eds.)

How is the development of global environmental issues shaped by scientific assessments and the institutions that create them? Assessments and the institutions that create them vary widely, ranging from formalized assessments such as those produced by the Intergovernmental Panel on Climate Change, to regular data publications such as those produced by the UN Environment Programme's GEO project, to loosely coordinated information networks such as those that support efforts to stem the unwanted spread of exotic species. Despite the growing quantity and quality of technical information available for use in managing transboundary environmental problems, surprisingly little attention has been paid to determining whether, how, and under what conditions technical information actually makes a difference. This edited volume will examine variation in the influence of scientific information, arguing that impacts vary with properties attributed to assessments by their received audiences. Three particular attributes are highlighted as proximate pathways of influence: salience, credibility and legitimacy. The authors attempt to demonstrate that these attributes are not inherent to assessments, but rather infused through the institutions and associated rules that guide their production.

Localizing and Globalizing: Knowledge Cultures of Environment and Development
(Sheila Jasanoff and Marybeth Long, eds.)

At the end of the twentieth century, when much of the world is intently marching to the tune of globalization, it is a point of no small interest that "the local" has emerged as a prominent focus of public policy. Nowhere is the category of "local" more in play than in the processes, discourses, and institutions of environment-development policy. International regimes for biodiversity, desertification, and forestry have embraced local knowledge both as a tool for addressing social and economic challenges and as a means for connecting with "on-the-ground" constituencies. Through attempts to systematize and institutionalize local knowledge, these regimes are negotiating new rules of participation and making room for unconventional forms of expertise. Claims to the specificity, even the superiority, of local epistemologies are underwriting new social identities, political coalitions of sometimes global reach, and novel legal rights for marginalized peoples. Yet, despite the increasing importance of local knowledge as an organizing concept in environment-development debates, its meanings and implications remain under-theorized. What precisely is local knowledge, and does its ascendancy threaten the universal status of "science"? What are the historical roots of contemporary interest in different knowledges? Who speaks for local knowledge and with what authority? What are the political and economic implications of local knowledge? And if science begins to be supplemented by other forms of knowledge, then what pitfalls, obstacles, and opportunities might the multiplying of knowledge cultures present for public policymaking? To take up these questions in depth, this book project brings together a wide range of professional experiences and disciplinary perspectives. Book contributions provide rich empirical and analytical accounts of the localization and globalization of knowledges in historical, contemporary, and comparative contexts. These chapters explore the place of local knowledge within modernist modes of knowing and governing, the political economy of local knowledge, local knowledge in global environmental politics, the competing knowledge cultures of industrial societies, and critical understanding of proliferating knowledges and their implications for environment-development policy.

For more information on the Global Environmental Assessment project see its web page at <http://environment.harvard.edu/gea>.

III. MARKET-BASED ENVIRONMENTAL POLICY

Robert Stavins, appointed ENRP Faculty Chair in 1997, has been a major force in the Center's work devising and analyzing market-based instruments to tackle environmental goals. Ten years ago, at the request of U.S. Senators Timothy Wirth (D-Colo.) and John Heinz (R-Penn.), Stavins

assembled and directed a team of 50 persons from academia, government, private industry, and the environmental community in a bipartisan effort — “Project 88” — which produced the report “Harnessing Market Forces to Protect Our Environment: Initiatives for the New President.” The tradable permit system for acid-rain reduction, recommended by Project 88, was included in the Clean Air Act amendments of 1990.

Over the past decade, increasing attention has been paid to market-based instruments — principally pollution taxes, fees and tradable permits — as a supplement to or substitute for conventional command-and-control instruments. Market-based instruments can be cost effective, minimizing the aggregate cost of achieving an environmental target, and can provide dynamic incentives for the adoption and diffusion of better technologies.

The American political process has gradually become more receptive to market-based instruments. Tradable permit systems were used in the 1980s to accomplish the phasedown of lead in gasoline and to facilitate the phase out of ozone-depleting chlorofluorocarbons. In the 1990s, tradable permit systems were used to implement stricter air pollution controls in the Los Angeles metropolitan region, and — most important — to control acid rain under the Clean Air Act amendments of 1990.

In 1998, researchers led by Robert Stavins completed a multi-year study of economic lessons learned from the SO₂ allowance trading program, examining the most extensive application ever attempted of a market-based approach to environmental protection. The results of this research appeared in an article in the summer edition of the *Journal of Economic Perspectives*. Stavins has also developed a revealed-preference method for econometrically estimating the supply (marginal cost) function for carbon sequestration. In 1999, Robert Hahn and Robert Stavins completed research, sponsored by the U.S. EPA, on the implementation of tradable permit regimes for global climate change. In a co-authored monograph, “What Has Kyoto Wrought? The Real Architecture of International Tradeable Permits,” these researchers investigated likely performance of international greenhouse gas trading mechanisms in the presence of a heterogeneous set of domestic greenhouse policy instruments.

ENRP’s market-based research has also focused on environmental technology innovation in the energy field. For three years, a Stavins-led team, funded by the U.S. Department of Energy, has been studying econometrically the factors affecting the nature, rate, and direction of innovation in energy-efficiency technology. An article appeared in the summer edition of *Quarterly Journal of Economics* by Richard Newell, Adam Jaffee, and Robert Stavins, titled “The Induced Innovation Hypothesis and Energy-Saving Technological Change.” In 1998, the team received a new \$500,000 grant from the U.S. Department of Energy to expand its research to the invention and diffusion of energy-efficient technology.

ENRP researchers have also investigated why there has been a great divergence between the recommendations of normative economic theory and positive political reality in regard to market-based and alternative forms of environmental policy instruments. Drawing upon intellectual traditions from economics, political science, and law, a set of researchers — Nathaniel Keohane, Richard Revesz and Robert Stavins — identified theoretical explanations in an article

published in the fall of 1999 in the *Harvard Environmental Law Review*, “The Choice of Regulatory Instruments in Environmental Policy.”

Robert Stavins and Richard Newell, an economist at Resources for the Future in Washington, are developing a method for using limited information available during the early stages of policy development to estimate the potential gains from using economic incentives relative to other approaches to achieving environmental performance. The work is supported by the U.S. Environmental Protection Agency. The degree of heterogeneity among sources in their marginal costs of pollution abatement may be the single most important factor affecting the relative cost of market-based versus conventional environmental regulations. The researchers seek to develop practical guidance for policy makers about the potential cost savings from using tradable permits or corrective taxes, rather than conventional policy instruments.

The analysis will provide a set of relatively parsimonious and intuitive “rules-of-thumb” for organizing understanding of the importance of cost heterogeneity and estimating its implications in particular policy situations. Features of a cost distribution (its degree of dispersion, asymmetry, and peakedness) may affect the gains from trade in different ways. Higher variance should lead to greater gains; cost distributions that are skewed left (right) should generally exhibit greater (lesser) gains relative to a symmetric distribution with the same range of costs. The more peaked is the distribution of costs, the lower should be the potential cost-savings from incentive-based approaches. Decision-makers need to know when to pursue the development of market-based instruments, since these instruments are not appropriate for all problems in all circumstances, and significant political costs may be involved in their pursuit. The project’s rules-of-thumb will help decision-makers with minimal data at their disposal.

In addition, Stavins co-edited with Paul Portney the new edition of *Public Policies for Environmental Protection*, which includes a new chapter by Stavins on “Market-Based Environmental Policies.” More broadly, Stavins is writing a chapter for the new *Handbook of Environmental Economics* on “Experience with Market-Based Environmental Policy Instruments.”

IV. EXECUTIVE TRAINING INITIATIVES

ECONOMICS AND THE ENVIRONMENT: A COURSE FOR THE NON-ECONOMIST

Robert Stavins is Faculty Chair of this week-long executive education program, targeted to professionals with little or no prior economic training who are involved in environmental analysis, advocacy, decision making, or implementation. As a practical introduction to environmental economics and its applications, the program establishes the basic foundations of economics and applies them to a range of environmental and resource problems, including global climate change, acid rain, and regional water quality management. Instruction in the use of fundamental analytical methods, such as benefit-cost analysis and cost-effectiveness analysis, is included. The course also reviews the advantages and disadvantages of alternative policy instruments, including technology and performance standards, pollution charges, and tradeable permit systems, in addressing specific environmental problems.

Attendees in May 2001, the program's third year, included officials from U.S. Federal and state environmental regulatory agencies, representatives of private business, non-profit organizations, and state and regional governments worldwide. The course has grown from 15 students in its first offering to 45 students this year.

The Program, inspired by the teaching and writing of Robert Stavins, provides a strong foundation from which the school can develop other offerings. It also has expanded to attract greater numbers of participants from the business and non-government organization communities.

MANAGING PUBLIC INFRASTRUCTURE

In January 1998, faculty at the Kennedy School, under the leadership of Professor Jose Gomez-Ibanez and Henry Lee, inaugurated a new training program entitled Infrastructure in a Market Economy. Over the course of 12 days, senior officials receive training in the broad issues and strategic choices associated with the private provision and public regulation of infrastructure. The need to develop and finance large-scale public projects, such as roads, power supply, water, ports and telecommunications often means that government officials in both industrialized and newly-industrialized countries must look to private investors for capital. The challenge for these officials is to find means of private provision that are technically defensible, economically feasible and politically acceptable. The program teaches participants to: analyze the economic and political implications of relying on private firms; manage the technical issues that shape privatization strategies, such as concession agreements; develop an effective privatization plan that maximizes short and long-term public benefits; and to determine whether to rely on market discipline or if there is a need for regulation and how to design effective regulatory agencies.

The original sessions focused primarily on privatization in Latin America. 120 senior officials from throughout the region have participated in these two sessions. In 1999-2000, the program was expanded to include officials from all five continents. The January session was held in Singapore, and abridged programs were presented to officials from the Middle East, the Balkans and South Africa. Over twenty-five new cases on infrastructure issues were developed.

In 2000-2001, the program continued to mushroom. Officials from twenty different countries attend the July session. The winter session in Singapore was moved to March, and for the first time we were able to attract senior officials from China, as well as most of the nations in Southeast Asia. The Asia Development Bank advertised the program to all its borrowing countries. Finally, the school is assisting the Inter-American Development Bank to establish a network of five universities located in Argentina, Columbia, Chile, Brazil and Peru to provide training on infrastructure to officials in those countries. Faculty from these universities spent a week in Cambridge in early May learning about core teaching and how to develop and present executive programs. We plan to meet again in January in Cartagena.

V. SCIENCE AND TECHNOLOGY IN A TRANSITION TOWARD SUSTAINABILITY

The Center is involved in a growing program of research on the enhancing the contribution of science and technology in support of a transition toward sustainability.

The transition towards sustainability – enhancing human well-being while conserving the earth’s life support systems and reducing hunger and poverty -- is one of the most challenging programs initiated by the international community. This is mainly because implementing Agenda 21, the work program set out by the United Nations Conference on Environment and Development in 1992, involves fundamental requirements. First, it entails significant institutional reform at the national level to achieve the integration of environment and development. The vision of sustainable development as articulated in major policy statements since the publication of *Our Common Future* in 1987 has recognized the critical role played by science and technology. Managing the transition towards sustainability will entail significant efforts to redirect science and technology. But the role science and technology has remained marginal to sustainability goals. This is partly because the science and technology policy community has often been concerned with growth strategies while the environmental community has been focusing on narrower conservation goals. Indeed, the activities of these two communities have often been seen as contradictory. Making the transition towards sustainability will entail bringing these communities together. Doing this will involve the clarification of theoretical aspects of the relationship between technological innovation, economic growth and environmental management as well as the associated institutional adjustments.

This Center’s emerging effort to address these challenges grows from independent activities that have been underway in its Science, Technology and Public Policy Program and its Environment and Natural Resources Program, and from our collaborations with Harvard’s Center for International Development and its University Committee on the Environment. This work has focused on the basic sciences of sustainability, energy technology innovations, and biotechnology and biodiversity. During the coming year we will seek to integrate these efforts to create a major program in Science and Technology in a Transition Toward Sustainability. For this report, we describe here two of the component activities based in the Environment and Natural Resources Program. Other foundation efforts are described in the section on the Science, Technology and Public Policy Program.

RESEARCH AND ASSESSMENT SYSTEMS FOR SUSTAINABILITY

This project seeks to foster the design and evaluation of strategies with which the next generation of national and international global environmental change programs might more effectively integrate and support its research, assessment and decision-support activities. It is being carried out as a collaborative endeavor involving scholars from Harvard, Stanford and Clark Universities, the Stockholm Environment Institute, the Potsdam Institute for Climate Research and the International Human Dimensions Programme on Global Environmental Change.

The project seeks to catalyze and contribute to three interrelated lines of work:

- Broadening the global change agenda to engage more directly the agenda of the other big new environmental idea of the last twenty years: sustainability. Our goal here is to help promote a reframing of the global change agenda in terms that will help to keep its research broadly but strategically engaged with a wide range of the world's most pressing development challenges.
- Developing a place-based, integrated understanding of global change effects and vulnerabilities. Our goal here is to combine natural and social science perspectives to develop and test common conceptual frameworks and analytic approaches for the integrated regional study of multiple, cumulative, interactive stress effects and multiple time scale responses related to global change.
- Designing, supporting and managing systems that can better integrate research, assessment and decision-support activities on problems of global change and sustainable development. Our goal is to experiment with and evaluate alternative models for such integration, with special emphasis on the trade-offs and tensions between centralized and distributed systems, stability versus adaptability of design, curiosity-driven versus problem-driven priority setting, and governmental versus nongovernmental and hybrid institutional settings.

The project seeks to contribute to the evolution of strategies for meeting these challenges through an international collaboration among a small set of leading scholars, practitioners and program managers involved in the production, assessment, and application of knowledge relating to global change and sustainable development. These include natural scientists, social scientists and policy analysts as well as individuals from several countries with substantial experience in running or advising research and assessment programs. Work in progress is reviewed at monthly "virtual" research meetings, conducted as an experiment in electronic collaboration. The project also hosts an international "Colloquium" designed to engage a select group of invited scholars and governmental agency scientific program leaders and officials in a structured discourse to explore the intellectual content and programmatic implications of sustainability-oriented research efforts, including the evolving new directions in global change research.

The project is supported by a core grant from the National Science Foundation (NSF) with contributions from the National Oceanic and Atmospheric Administration's Office of Global Programs. It is based at the Belfer Center under the the leadership of Bill Clark (Director) and Nancy Dickson (Executive Director). For more information visit <http://sust.harvard.edu>.

INTERNATIONAL INITIATIVE ON SCIENCE AND TECHNOLOGY FOR SUSTAINABILITY

The International Initiative on Science and Technology for Sustainability is an informal, open-ended, international collaboration that seeks to engage a growing community of participants in pursuing the goals noted above and to facilitate communication and collaboration throughout the interested community. It emerged from the recommendations of the Friibergh Workshop on Sustainability Science (October 2000), organized through the Center to explore needs and opportunities in this area. The Initiative's *Committee on Science and Technology for Sustainability* is open to individuals and institutions around the world actively engaged in

sustainability science research and in promoting development of the field. Strategic guidance for the Initiative is provided by a Steering Group co-chaired by Robert Kates (former director of the World Hunger Program at Brown University and currently a Visiting Scholar at the Kennedy School) and Akin Mabogunje (chairman of the Development Policy Center, Nigeria). The Initiative is supported by a Secretariat based at the Center that involves William Clark, Robert Corell, Nancy Dickson, Robert Frosch, Calestous Juma, Robert Kates and James McCarthy. Over the next year, the Initiative will conduct a series of regional workshops on science and technology for sustainability (Latin America, Africa, Asia, Europe, North America), a series of workshops on the international research system for sustainability science, and an intensive effort to provide input to the World Summit on Sustainable Development. It will also operate the internet-based *Sustainability Science Forum* (<http://sustainabilityscience.org>) and an associated electronic newsletter.

OTHER INITIATIVES

I. ENVIRONMENTAL REGULATION

During 2000-2001, Professor Cary Coglianese continued his research on the regulatory process and the design of regulatory strategies. His research focused on three principal areas: the development of management-based strategies for addressing environmental problems; the use of consensus-building as a way of making environmental policy decisions; and the role of science and economics in setting environmental standards.

Environmental Management Systems

Coglianese's new book, *Regulating from the Inside: Can Environmental Management Systems Achieve Policy Goals?* (RFF Press, 2001), examines the rising use of environmental management systems (EMSs) by private firms and the implications these "internal regulatory systems" hold for environmental policy. Worldwide, hundreds of thousands of firms have adopted or are considering adopting EMSs in accordance with standards such as those found in ISO 14001, EMAS, Responsible Care, and the Sustainable Forestry Initiative. State and federal regulators are watching these developments closely and have proposed or adopted a variety of policy responses designed to encourage more firms to rely on EMSs and designed to allow regulators to treat firms with EMSs differently than other firms. This book grows out of a series of meetings held at Harvard and in Washington, D.C. that brought together representatives from government, industry, NGOs, and academe to frame the future policy and research agenda about environmental management systems. The book is organized around two critical questions: How have EMSs worked in firms that have already adopted them? What potential benefits and limitations do they have as policy tools for the future? The book examines why firms adopt EMSs; how they implement them; how EMSs address concerns about fairness, corporate social responsibility, and sustainability; and what impact EMSs may have on achieving environmental protection within a global economy. Coglianese also co-authored an article on environmental management systems and public policy that recently appeared in *Issues in Science and Technology*.

Negotiating Regulations

Coglianesse has also continued his research on the use of consensus-building within the regulatory process. In "Is Consensus an Appropriate Basis for Regulatory Policy," recently published in a volume comparing regulatory innovation in the U.S. and Europe, he reexamines the emerging trend towards basing public policy on agreement. In this article, Coglianesse argues that consensus-building introduces serious pitfalls into the policy process and yields remarkably few benefits that cannot be achieved through ordinary, participatory procedures. In another recently published article, "Assessing the Advocacy of Negotiated Rulemaking," Coglianesse responds to critics of his earlier research on negotiated rulemaking, showing that when properly analyzed negotiated rulemaking fails to live up to the claims that have been made for it over the years. He concludes that negotiated rulemaking demands much additional time and resources on the part of agency officials and other participants, without leading to any demonstrable improvements in terms of conflict avoidance or other goals.

II. WATER PROJECT

Robert Stavins is working with Kennedy School Public Policy Ph.D. student Sheila Cavanagh and Professor Michael Hanemann of the University of California, Berkeley on a multi-year project analyzing alternative policy instruments for managing urban water supplies. The project, Urban Price and Non-Price Demand Management in U.S. Urban Water Markets, funded by the National Science Foundation, examines the potential of prices and price structures to influence water consumption in the urban residential sector, comparing the cost-effectiveness of price and non-price utility demand management policies. Working with the first data on residential end-uses of water in multiple U.S. cities, which disaggregate household water uses within total metered consumption, they examine the component end-uses of water, and compare end-use responses to price and non-price instruments. They will estimate the portion of cross-city variation in price elasticity that is due to factors beyond the control of policymakers, such as income and family size, as well as that portion that can be highly sensitive to policy, such as appliance choice. In doing so, they will provide a useful approximation of the magnitude of water conservation achievable through reasonable price and non-price policies in the urban residential sector.

III. APPALACHIAN TRAIL ENVIRONMENTAL MONITORING INITIATIVE

The Appalachian Trail Environmental Monitoring Initiative (ATEMI) will act as an early warning system for the environmental health of the Appalachian mountains, using the trail that winds through 14 states as its focus. In the last year, the initiative has blossomed from the idea presented in the 1999 concept paper written by Charles H.W. Foster, a Senior Fellow at BCSIA, and Karen Filipovich, Associate Research Director of ENRP, to the first steps of implementation through sponsorship by the National Park Service (NPS). In October, Harvard organized a meeting, in conjunction with the Appalachian Trail Conference (ATC), to confirm the vision and

build support for it in the NPS and ATC (the managers of the trail), as well as within the broader monitoring community along the trail. This, along with several other meetings led by Tom Gilbert of the Southern Appalachians Man and the Biosphere project, culminated in the acceptance of the concept and the subsequent hire of a trail-wide coordinator to begin to implement the initiative. The ENRP will continue to act as an advisor and sounding board as this idea, seeded here, continues to take root and grow.

IV. CIVIC ENVIRONMENTALISM

In December 2000, ENRP published the summary report of Charles H.W. Foster's national inquiry into environmental regionalism, the focus of his fifteen years of teaching and research at ENRP. The findings indicate a resurgence of interest throughout North America in transboundary and transjurisdictional approaches, so much so that the Lincoln Institute of Land Policy is likely to launch a follow-up project next year with Foster's help to create one or more centers of excellence to encourage and facilitate regional environmental ventures. Also to be explored are state or federal executive orders, or even special legislation, declaring it to be national policy to encourage grass-roots, participatory, and self-reliant solutions to environmental problems.

Closely related to the Harvard Environmental Regionalism Project and to Robert Putnam's pioneering work in the nature of social capital is a new field called civic environmentalism, which deals with citizen-participatory forms of environmental intervention. With leadership from Charles H.W. Foster and Archon Fung of the Kennedy School, and the help of two New England-based experts, DeWitt John of Bowdoin College and William Shutkin of MIT, Harvard and MIT jointly sponsored a six-part roundtable seminar series during the spring of 2001 to explore various facets of the field. One intriguing outgrowth of the colloquy is likely to be the drafting of an executive order, to be issued either by the governor or the state secretary of environmental affairs, making Massachusetts a national pioneer in civic environmentalism. This initiative seems singularly appropriate given Massachusetts' and New England's historic town meeting tradition and their leadership in creating the city and town conservation commission movement.

V. TOXIC RELEASE INVENTORY

Mary Graham, a Research Fellow jointly at the Environment and Natural Resources Program and the Taubman Center for State and Local Government, has assessed the effectiveness of the disclosure requirements of the Toxic Release Inventory (TRI). Structured disclosure is emerging as an important tool of risk regulation in the United States. The TRI provides early and valuable lessons about the role of disclosure as part of a complex web of changing political and economic forces that influence corporate decisions. Mary's work attempts to further our understanding of how TRI has worked and the transferability of the lessons to other efforts to use information disclosure to reach regulatory goals.

VI. SCIENCE, TECHNOLOGY, POLITICS AND LAW

During 2000-2001, Sheila Jasanoff's research focused on science, technology, politics, and law

in three arenas: the U.S. domestic scene; comparisons between the United States and Europe; and the international picture. Under the first heading, she researched and wrote a series of papers on the implications of the use of court-appointed experts in litigation, for example, in the multidistrict litigation on silicone gel breast implants. Jasanoff's comparative research centered on the regulation of biotechnology in the U.S. and Europe, with specific interest in the emergence of new bioethics principles and scientific advisory institutions in several European countries and the United States. She examined the controversy over genetically modified crops and mad cow disease; she also supervised a project comparing the scientific reliability of air pollution and biotechnology standard-setting in the US and the European Union. At the global or transnational level, her research is most concerned with the role of new global science bodies such as the Intergovernmental Panel on Climate Change (IPCC) in cementing particular framings of environmental problems, and the implications of these processes for sovereignty and governance. More broadly, Jasanoff has been exploring the constitutional issues raised by new developments in science and technology. Jasanoff and Fred Schauer, Kennedy School Academic Dean, continued work on this issue under a 3-year training grant from the National Science Foundation entitled "Reframing Rights: Constitutional Implications of Technological Change."

Jasanoff chaired the Interfaculty Group on Genetics, Biotechnology and Society for a second year. This group aimed to identify cross-cutting intellectual and ethical issues raised by the intersection of genetics, biotechnology and society. She also served as president of the Society for Social Studies of Science, with primary responsibility for organizing the 2001 annual meeting in Cambridge next November. She completed her work as Section Editor for Science and Technology Studies of the *International Encyclopedia of the Social and Behavioral Sciences*, and continued to serve on the editorial advisory boards of *Global Environmental Politics*; *International Studies Review*; *Science and Engineering Ethics*; *Social Studies of Science*; *Science, Technology, and Human Values*; *Science Communication*; and MIT Press's series on Science, Politics and Environment.

Jasanoff organized 4 workshops this year at Harvard. "Machinery of Representation: Voting Technologies and the 2000 Presidential Election" was held on March 15-16, 2001 at the Kennedy School and co-sponsored by the Department of Science & Technology Studies (S&TS) at Cornell University. The workshop focused on the epistemological and sociotechnical dimensions of the contested vote in Florida, examining the issues raised for science and technology studies, as well as for related political, policy, and legal analysis.

"Localizing and Globalizing: Knowledge Cultures of Environment and Development" was held on April 7-8, 2001. This workshop sought to present rich empirical and analytical accounts of the localization and globalization of environmental knowledges in historical, contemporary, and comparative contexts. The papers presented explored the place of local knowledge within modernist modes of knowing and governing, the political economy of local knowledge, local knowledge in global environmental politics, the competing knowledge cultures of industrial societies, and the implications of these phenomena for environment-development policy.

"Biotechnology and Global Governance: Crisis and Opportunity," sponsored by the Weatherhead Center for International Affairs, the Kennedy School of Government, the Asia Center, the University Committee on Environment, and the Program on Negotiation, was held on

April 26-28, 2001. This conference brought together over 35 major international players from science, industry, government, NGOs, and academic social sciences for a focused, two-day meeting in order to build new insights in three major areas: emerging institutional responses to managing scientific uncertainty; changing roles of consumer and public participation in governmental and corporate decisionmaking; and principles of accountability in knowledge production, ownership, and use.

“Owning-Up: Bodies, Selves, and the New Genetic Property” was held on May 4-5, 2001. This workshop sought to explore questions about property and ownership that have begun to link up with emerging genomic ideas and practices, for example: Who is an inventor? What is an invention? Are property claims asserted only through the law? Does innovation curtail rights or simply expand them? In asking how property claims relate to new genetic understandings of the natural world, the human body, and the self, the workshop drew on analyses of specific cases and legal decisions, emergent practices, and evolving theoretical debates. A goal of the workshop was to consider how intellectual property regimes can better balance society's urge to innovate with the varied social, cultural and scientific values that are implicated in the rise of genomics.

VII. HARVARD ELECTRICITY POLICY GROUP

Based within the School's Center for Business and Government, the Harvard Electricity Policy Group (HEPG) provides a forum for the analysis and discussion of important policy issues related to the restructuring of the U.S. electricity industry. Faculty from ENRP have worked closely with HEPG on a wide variety of issues. The program's objectives are to address key problems related to the transition to a more competitive electricity market, to provide a forum for informed and open debate, and to provide a vehicle for contributing to the wider public policy agenda. Priority issues on HEPG's agenda include the economics of electricity production and use; the evolution of the industry and its regulatory institutions; transition paths and strategies; and related public policy issues such as the environment and consumer protection. Membership in HEPG includes high-level representatives of utility companies and independent power producers, state and federal regulators, environmental and consumer advocates, and academics.

Both Henry Lee and Phil Sharp have been involved in projects with HEPG concerning the California electricity crisis. Henry Lee is currently finishing a case study on California's electricity restructuring and has published a recent paper on switching Midwest generating plants from coal to natural gas. HEPG faculty also participated in this year's Infrastructure in a Market Economy program.

NEW RESEARCH INITIATIVES 2001

I. ENVIRONMENTAL ECONOMICS PROGRAM

Established at the end of 2000 under the direction of Professor Robert Stavins, the Environmental Economics Program at Harvard University (EEPHU) is the newest of a diverse and growing set of Harvard initiatives in the environmental area. EEPHU is a University-wide

program co-sponsored by the Center for Business and Government at the Kennedy School of Government and the University Center for the Environment. The program brings together faculty and graduate students from across the University engaged in research, teaching, and outreach efforts in environmental and natural resource economics and related public policy, and serves as a launching point for new efforts.

Harvard has tremendous strength in environmental and natural resource economics, with that capability spread across many units of the University, including the Faculty of Arts and Sciences, the Kennedy School, the School of Public Health, the Business School, the Graduate School of Design, and the Law School. The Environmental Economics Program has 17 Faculty Fellows with great expertise and international reputations in the area of environmental and natural resource economics, including senior faculty members who now hold or have held important positions at the President's Council of Economic Advisors, the U.S. Environmental Protection Agency's Science Advisory Board, the National Academy of Sciences, the World Health Organization, and the Intergovernmental Panel on Climate Change. In addition, the Faculty Fellows group contains some of the brightest young talent in the field.

Just a small sample of topics addressed by EEPHU Faculty Fellows would include such pressing issues as: global climate change, the use of incentive-based or market-based instruments for pollution control, new methods of valuing risk reduction, the relationship between globalization and the environment, the role of environmental considerations in business decision making, and the intersection of economic development and environmental protection.

This unique degree of faculty expertise is complimented by an exceptional group of doctoral students who serve as Pre-Doctoral Fellows within the Program. EEPHU is not a degree-granting program; rather, students pursuing the Ph.D. degree in economics, political economy and government, public policy, or health policy, and whose dissertation interests are focused on environmental and natural resource economics are invited to become Pre-Doctoral Fellows. In addition to working closely with the Faculty Fellows, and attending the regular Seminar in Environmental Economics and Policy, the Pre-Doctoral Fellows have their own Research Lunch Seminar that allows graduate students to benefit from each other's experience.

II. ENERGY USE AND THE GROWTH IN INFORMATION TECHNOLOGY

In October 2000, faculty and staff from the Environment and Natural Resources Program worked with the Rand Corporation to develop and present a panel discussion on the impact of the projected growth in the use of information technology (IT) on energy consumption and supply. The panel, organized by Henry Lee, was part of the Department of Energy's E-Vision 2000 Conference. Dale Jorgenson, along with three other speakers, presented papers addressing both the magnitude of IT's impact on energy demand and the opportunities advances in IT technology might provide in meeting future energy goals.

DOE has asked the ENRP to expand upon its research and assist the agency with a follow-up conference tentatively scheduled for the fall of 2001.

III. WORKSHOP ON SETTING ENVIRONMENTAL RISK STANDARDS

On May 31, the Environment and Natural Resources Program, the Center for Business and Government, and the Environmental Economics Program convened an interdisciplinary workshop in Washington DC focusing on the role of science and economics in setting environmental risk standards. The Supreme Court's review of EPA's air quality standards in the American Trucking case called attention to the role of costs in standard-setting, while the Bush Administration's decision to revisit key drinking water standards has brought the role of risk and economic analysis into the fore.

The workshop focused on how scientific research is organized and how it contributes to risk management. It addressed the role of benefit-cost and cost-effectiveness analysis in light of present political and legal constraints, and it discussed strategies for institutionalizing risk and economic analysis in the setting of environmental standards.

MEMBERS ACTIVITIES

FACULTY

William Clark is the Harvey Brooks Professor of International Science, Public Policy and Human Development. At Harvard, Clark is a member of the University Center for the Environment, the Executive Committee for the Weatherhead Center for International Affairs and of the Board of Tutors for the College's concentration in Environmental Science and Public Policy.

Clark's research focuses on the sources of long-term social learning to cope with the policy issues arising through the interactions of environment, development, and security concerns in international affairs. In particular, he has studies under way on the role of science and technology in sustainable development, the development of better assessment frameworks for use in the management of global environmental change and on the problems of monitoring and evaluating progress toward sustainable development.

His newest effort is as one of the leaders of an international initiative to improve the contribution of science and technology to sustainable development. Clark's interest in the subject dates back 15 years to his time as leader of the project, and on Sustainable Development of the Biosphere at the International Institute for Applied Systems Analysis in Austria, and his editorship there of a book of the same name. Starting in the mid-1990s, Clark co-chaired the study *Our Common Voyage: A Transition towards Sustainability* for the National Academy of Science's National Research Council. The report was released in the fall of 1999, and is available at <http://www.nap.edu/books/0309067839/html/>. Most recently, he has helped to organize the "Sustainability Science Initiative," a consortium of natural and social scientists, development

scholars and engineers interested in fostering more effective application of research and development to pressing development problems. The Initiative's initial findings and agenda were recently published in an article co-authored by Clark in *Science* magazine, and are described in more detail on its web site <http://www.sustainabilityscience.org>. Support has been provided by the National Science Foundation, National Oceanographic and Atmospheric Administration, and Packard Foundation.

In 1997, the White House Office of Science and Technology Policy launched an effort to provide a periodic, succinct, and credible report on the health of the nation's ecosystems. Clark chairs the committee responsible for designing and producing the first report. Housed and staffed at the Heinz Center for Science, Economics, and the Environment in Washington, the report is meant to serve some of the functions provided by the nation's system of macroeconomic indicators — that is, an authoritative, nonpartisan, quantitative base for sound policymaking and an informed dialogue on how well the country is doing at crucial management tasks. The Design Committee chaired by Clark is a multisectoral group with members from all levels of government, the private sector, the environmental community, and academia. A prototype report on *The State of the Nation's Ecosystems* focused on forests, croplands, and coastal/marine systems was released in the fall of 1999. A final report will be available in spring of 2002. Details and updates are available on the Heinz Center's Web page (http://www.heinzctr.org/Programs/report_cards.htm). The prototype report itself is available at <http://www.us-ecosystems.org>.

This was the fifth and final year of the Global Environmental Assessment Project, a collaborative project conducted under the auspices of the Harvard University Committee on the Environment. The goal of the project has been to explore the role played by formal assessments in linking science to policy for issues of global environmental change. The project has focused on experience with climate change and tropospheric pollutants in North America, Europe, and India, with additional global looks at assessments on biosafety and desertification. Led by Clark and Nancy Dickson of BCSIA, the core steering group for this venture includes Sheila Jasanoff, John Holdren, and Ted Parson of BCSIA, Jim McCarthy and Dan Schrag of Harvard's science faculties; Robert Keohane of Duke, and Jill Jäger, Executive Director of the International Human Dimensions of Global Environmental Change Program in Bonn. Each year, the project recruited internationally to bring to the Center a half dozen predoctoral and postdoctoral fellows to study and conduct research with faculty. The year's work was brought together in a week-long summer study of scholars and practitioners. Over 40 working papers have emerged from the project, are available through its web page (<http://environment.harvard.edu/gea/>), and are now beginning to appear in the peer-reviewed literature. Three books are now in preparation to summarize the conclusions of the project. Support has been provided by the National Science Foundation, the National Oceanographic and Atmospheric Administration, the U.S. Department of Energy, the National Institute for Global Environmental Change, NASA and the U.S. Environmental Protection Agency.

Along with collaborators Nancy Dickson of BCSIA, Jill Jäger of the International Human Dimensions of Global Environmental Change Program, and Josee van Eijndhoven of the Netherlands' Utrecht University, Clark completed a multiyear comparative history of social responses to climate change, stratospheric ozone depletion, and acid rain. The resulting book, published by MIT Press in June 2001, involved 40 authors in a coordinated effort to document

how nine countries (including Japan, Germany, the former Soviet Union, and the United States, the European Union, and the family of international institutions) interacted to move these issues of global environmental change from the scientist's bench to the high table of international diplomacy. Support was provided by the MacArthur Foundation, IBM Foundation, and the National Science Foundation. The project is further described at <http://www.ksg.harvard.edu/sl/index.htm>.

Clark continued as co-editor of *Environment* magazine, along with colleagues Robert Kates, Alan McGowan, and Timothy O'Riordan. The magazine, which appears ten times a year, serves as a forum for timely, authoritative, and readable treatments of major issues at the intersection of environment, development, and public policy. He also serves on the editorial boards of *Ecological Applications* and *Conservation Ecology*.

Clark teaches the Kennedy School courses in "Environmental science for public policy," "Sustainable development," and "Experts, expertise and public policy". He is also codirector of the sophomore tutorial in "Environmental Science and Public Policy" at Harvard College. He received his PhD in zoology from the University of British Columbia. Before coming to Harvard in 1987, he held research positions at the Institute for Energy Analysis (Oak Ridge, TN) and the International Institute for Applied Systems Analysis in Austria. He is a recipient of the MacArthur Prize (1983) and the Manuel Carballo Award as the Kennedy School's outstanding teacher (2001). Additional information on Clark's background, accomplishments and publication record is available at http://ksgnotes1.harvard.edu/people/William_Clark.

Cary Coglianese continued his research on the regulatory process and the design of regulatory strategies during 2000-2001. His research during the past year has focused on four principal areas: the development of management-based strategies for addressing environmental problems; the use of consensus-building as a way of making environmental policy decisions; the role of science and economics in setting environmental standards; and the impact of judicial review on regulatory agency decision making.

Coglianese's new book, *Regulating from the Inside: Can Environmental Management Systems Achieve Policy Goals?* (RFF Press, 2001, co-edited with Jennifer Nash), examines the rising use of environmental management systems (EMSs) by private firms and the implications these "internal regulatory systems" hold for environmental policy. This book grows out of a series of meetings held at Harvard and in Washington, D.C. that brought together representatives from government, industry, NGOs, and academe to frame the future policy and research agenda about environmental management systems.

Coglianese has also continued his research on the use of consensus-building within the regulatory process. In "Is Consensus an Appropriate Basis for Regulatory Policy," recently published in a volume comparing regulatory innovation in the U.S. and Europe, he reexamines the emerging trend towards basing public policy on agreement.

Coglianese also published an essay in *Environment* year on the recent Supreme Court litigation in the American Trucking case, which examined EPA's revised ozone and particulate standards. He argued in advance of the Court's decision that the litigation had much more to do with the

role of costs in setting air quality standards then about the constitutional issues that were raised by the appellate court. Coglianesi also served as counsel of record and coauthor of an amicus curiae brief submitted to the Supreme Court in the American Trucking case, a friend of the court brief submitted on behalf of twenty scientists, economists, and legal scholars. The brief argued that scientific evidence should be supplemented by policy analysis in order to make principled decisions about environmental risk standards. Coglianesi recently organized a policy workshop around these issues in Washington, D.C., a conference sponsored by the Environment and Natural Resources Program, the Environmental Economics Program at Harvard University, and the new Regulatory Policy Program at the Center for Business and Government (the last of which Coglianesi chairs). The conference brought together more than thirty leading economists, scientists, and legal scholars to deliberate over the appropriate roles for science and economics in setting environmental standards.

Coglianesi's current research investigates the impact of judicial review on the federal regulatory process, analyzing trends in agency rulemaking over the past forty years to test for the effects of court intervention on the activity of regulatory agencies. Scholars and policymakers widely believe that judicial review under the Administrative Procedure Act has created numerous roadblocks for federal regulatory agencies, leading to what some have termed the "ossification" or "paralysis" of the rulemaking process. In some cases, judicial review has purportedly caused agencies to abandon rulemaking altogether or to shift resources to activities that are more insulated from judicial review. Although claims about the impact of judicial review are widely accepted, the evidence to support them has so far primarily consisted of limited case studies.

Coglianesi's current project seeks to test the ossification effect systematically, investigating whether the purported effects of ossification are indeed occurring and evaluating the extent to which judicial review may be responsible for any observed changes in federal agency rulemaking over time. Preliminary analysis of data on regulatory outputs from the Office of Federal Register suggest that it is far from clear that there has been a wholesale retreat from rulemaking. There has been a steady overall growth in federal regulation, notwithstanding the introduction of supposedly more stringent "hard look" review and various executive branch review requirements. The ultimate results of this research project should contribute to the legal and social science literature on regulatory policymaking while also informing policy deliberation over the role of federal courts in reviewing regulatory policy.

William W. Hogan, Lucius N. Littauer Professor of Public Policy and Administration at the John F. Kennedy School of Government, Harvard University, is Research Director of the Harvard Electricity Policy Group (HEPG) which explores the issues involved in the transition to a more competitive electricity market. He serves as Director of Graduate Studies for the Ph.D. programs at the Kennedy School and is also Co-Director of the Harvard-Japan Project on Energy and the Environment and of the Repsol-Harvard Seminars on Energy Policy.

Hogan's research focus -- the intersection of energy economics and public policy -- reflects the significant shift in energy policy during the past decade: recognition of the primary role of markets in determining energy policy, with governments maintaining the responsibility for developing institutions and rules that will support efficient, competitive markets. The inevitable

tension between public and private, between government and business, between regulation and markets, is the basis for his continuing research in energy policy.

In 1993 Hogan co-founded the Harvard Electricity Policy Group (HEPG) at the Kennedy School (see below) and has been actively engaged in the design and improvement of competitive electricity markets in many regions of the United States, as well as around the world, from England to Australia. Hogan has worked to design the market structures and market rules by which regional transmission organizations, in various forms, coordinate bid-based markets for energy, ancillary services, and transmission rights. He pioneered the development of financial transmission rights (FTR) systems now in use in New York and in the Pennsylvania-New Jersey-Maryland (PJM) area that allow market participants to hedge congestion costs.

The world has experienced a decade of pathbreaking work in electricity restructuring, efforts that have been marked by noted successes and dramatic failures. In "Electricity Market Restructuring: Reform of Reforms," (a paper presented for the 20th Annual Conference, Center for Research in Regulated Industries, Rutgers University, forthcoming in the Journal of Regulatory Economics), Hogan reviews the decade, with a particular focus on the threads that relate to competitive wholesale market design. From this experience, he concludes that easy access to a coordinated spot market directed by an independent system operator (ISO) is the critical requirement in the design of wholesale markets. The ISO must assume responsibility for organizing these functions within the framework of a bid-based, security-constrained economic dispatch with locational pricing. When the ISO assumes this role, the market has the tools available to deal with the most important network complexities that otherwise confound electricity markets. As experience develops, the reforms of reforms reveal just how critical are the details of electricity market design, and how they constrain what can be done.

In the wake of the California price spikes, public debate and policy discussions have been dominated by a focus on market power, particularly by independent generators and marketers, as a principal cause. Hogan questions this assumption in his paper "On the Exercise of Market Power Through Strategic Withholding in California" (April 2001), authored with Scott Harvey. On its face, the experience of extremely high prices suggests that the exercise of market power could be important. However, data which show that there have been profound changes in the California market as well as the widespread impacts of higher electricity prices throughout the western market, indicate that the exercise of market power cannot be assumed to be the principal cause of the price spikes. At most, the market power theme is only part of the story. In short, this is a complicated story, and there is ample room for further investigation of the data and diagnosis of causes.

The thrust of the authors' analysis is not to prove that market power has not been exercised in the electricity market but, rather, to suggest that it is unlikely to be the dominant factor and may not even be significant. With the available data in the public domain, the special complications introduced by the California market design, and the concomitant set of simplifying assumptions used in analysis of behavior in the California markets, the margin of error in estimating the extent of the possible exercise of market power through strategic withholding of electric generation is of the same order of magnitude as the effect being measured. Thus the authors conclude that, on balance, the publicly available data provide no reason for the Federal Energy

Regulatory Commission to change its conclusion that there is no evidence of strategic withholding -- nor any proof that no strategic withholding has occurred.

Hogan sees Regional Transmission Organizations (RTOs) as the foundation of an effective market structure. In his work "The RTO Millennium Order: Following Through or Falling Apart?" he argues that, although the Federal Energy Regulatory Commission got the major elements right in its 2000 Order on RTOs, it is sketchy in its details and there is no commitment for the FERC to follow through. The FERC Order provides a solid base, but on details of such important elements as congestion management, balancing and ancillary services, FERC needs to fit the pieces together. The RTO model contains a consistent framework, but FERC must see that it is implemented.

Hogan has continued his work on transmission rights, including his paper "Flowgate Rights and Wrongs," in which he offers the flowgate model as an alternative to efficient pricing in a coordinated dispatch with point-to-point financial transmission rights (FTRs). A distinctive characteristic of flowgate models is the recognition that power will flow over multiple parallel paths and transmission rights are defined accordingly. Yet questions remain as to how these rights would affect use of the grid and how they would interact with an efficient balancing market. This paper discusses these interactions and suggests a view of what could or should be done by the RTO versus the commercial market. *These and other papers are available on Professor Hogan's website, ksgwww.harvard.edu/people/whogan*

In 1993 Hogan co-founded the Harvard Electricity Policy Group to establish an impartial forum for discussion among the many groups involved in restructuring -- including industry executives from franchise utilities and independent power producers, consumer advocates, regulators and other officials from state and federal governments, members of the environmental and finance communities, and academics. The group has not sought to achieve consensus but to analyze and inform the industry, policymakers and the larger public. The HEPG publishes papers and distributes relevant material from its extensive library, *pro bono*, through its web site. (ksgwww.harvard.edu/hepg)

During 2000-2001, as might be expected, HEPG's research and policy agenda highlighted the California crisis. The culmination was a public forum at the KSG in April which examined "The California Blackouts: Could It Happen Here?" The panel included a legislator and a consumer advocate from California, a Massachusetts utility executive and was moderated by former U.S. Congressman Philip Sharp. The HEPG continued its series of plenary sessions and special seminars in which California problems shared the agenda with Regional Transmission Organizations (RTOs) as the basis for organizing electricity markets; market power; the state of retail competition; multi-settlement systems; demand-side management.

During the past year, Hogan has spoken frequently on electricity restructuring and institution building at conferences and seminars, including events in Japan, New Zealand, the United Kingdom and Europe, as well as in the United States. Sponsors have included The International Association for Energy Economics (IAEE), International Bar Association, Edison Electric Institute, and the Aspen Institute Program on Energy, the Environment, and the Economy. He

has testified on these issues before the U.S. Senate, the U.S. House of Representatives, the Federal Energy Regulatory Commission, and state regulatory bodies.

For more than a decade Hogan has co-directed the Harvard-Japan Project on Energy and the Environment with Professor Dale Jorgenson. The Project has produced research on all aspects of the energy industry; recent papers have examined, for example, the effects of Chinese economic growth on the Chinese environment, the development of energy infrastructure in Asia, and the creation of a competitive electricity industry in Japan. (That country, too, is seeking to adjust market forces and lighten government regulation.) The Project acts as sponsor to several Japanese Research Fellows each year at the Kennedy School who investigate topics of mutual interest.

In another energy venture with an international focus, the Repsol YPF - Harvard Seminars on Energy Policy, Hogan has created a forum for the consideration of a range of energy and public policy issues across the entire spectrum of energy industries -- oil, natural gas, and electricity -- for an international audience. Co-sponsored by Repsol YPF, the privatized Spanish oil company, the seminars have expanded from their original focus on oil and energy security policy in Europe and North America to the current worldwide scope of topics and geographic regions. The XI Seminar (2000) was held in Buenos Aires, Argentina; the XII Seminar (2001) was held in Mallorca, Spain.

Professor Hogan was a founder and serves on the editorial board of the *Energy Journal*; he is also on the editorial board of *Energy Economics*. He has served as a member of the Advisory Council and Executive Board of the Gas Research Institute. He is a Director of LECG LLC. He graduated from the U.S. Air Force Academy and received a Ph.D. from UCLA.

Henry Lee, the Jaidah Family Director of the Environment and Natural Resources Program, is a Lecturer in Public Policy and the Co-Chair of the Kennedy School's project on privatizing and regulating public infrastructure. Lee's recent research has focused on four areas – climate change, electricity policy and air pollution, international electricity markets, and privatization of public infrastructure in developing countries, with an emphasis on water and electricity.

In the 2000-2001 academic year, he conducted a major study assessing the opportunities and obstacles to carbon emission reductions in the Russian electricity sector. This effort identified the institutional and economic hurdles that would have to be addressed if Russia is to enter into any type of international carbon trading regime. Its conclusion was that the challenges facing Russia, both in terms of regulation and attracting new investment were very large and would make emission trading difficult without the enactment of major reforms.

Lee continued his work on climate change and wrote a chapter and co-authored a journal article on the factors influencing the U.S.'s action and policies on climate change over the past 12 years. He examined the initiatives taken by former Presidents George Bush and William Clinton. His work will appear as a chapter in a book, *Climate Change: Science, Strategies, and Solutions* to be published this summer by the Pew Center for Climate Change.

Lee has initiated a new project assessing the impact of distributive electricity technology on energy use and environmental quality. Reliability concerns and high prices have stimulated many users to assess the feasibility and economics of decentralized energy systems. How significant might this change be and what are the factors that will affect the rate of change? How should federal and state air pollution officials respond? Lee is explaining these questions under a grant from the Environmental Protection Agency.

Lee, along with Professor Tony Gomez-Ibañez, Co-Chairs the Kennedy School's executive training program on Infrastructure in a Market Economy. The program, given twice a year, has attracted more than 300 participants from around the world. In the context of this program, he has overseen or written many case studies, including a new case on the California electricity crisis, written in the Spring of 2001. In addition, Lee has participated in abridged versions of this program in Brazil, Singapore, and Saudi Arabia. Finally, Lee and Gomez-Ibañez are assisting the Inter-American Development Bank to build a network of five Latin American universities (in Argentina, Brazil, Peru, Columbia, and Chile) to train regulators and policy makers on how to regulate and manage public infrastructure. Lee also participated in workshops for senior officials from the Balkans and Middle East countries.

Finally, Lee in cooperation with the U.S. Department of Energy and the RAND Corporation organized a one-day session on the impact of the advances of information technology on energy supply and consumption. Lee oversaw the development of five papers that will appear in a report to be edited by RAND.

Lee is a member of the Energy Modeling Forum, the Braintrust of the Coalition for Clean Air Policy, and the Advisory Committee to the New England Independent System Operator. He served on the advisory panel to the Department of Energy's Energy Information Agency on the proposed four-pollutant bill (NOx, sulfur dioxide, mercury, and carbon dioxide). With John Holdren, Lee co-directs BCSIA's Energy Technology Innovation Project. Finally, he serves as the faculty chair of the KSG Committee on Environmental Resources, and is the school's representative to the University's Greening of Harvard Initiative.

Edward A. Parson is Associate Professor of Public Policy. Parson's research interests lie in two related fields: environmental policy, particularly its international dimensions, and negotiations and conflict resolution. Parson's book "Protecting the Ozone Layer: Science, Strategy, and Negotiation in the Making of a Global Environmental Regime" will appear in 2002. He is an author of "Climate Change Impacts on the United States" (National Assessment Synthesis Team, Cambridge University Press, 2001) and the editor of "Governing the Environment: Persistent Challenges, Uncertain Innovations" (University of Toronto Press/les Presses de l'Université de Montréal, 2001). Other recent publications include examinations of policy implications of new technologies of carbon management, in *Science* and in *Scientific American* (with D.W.Keith); studies of the Kyoto Protocol's "Clean Development Mechanism," in *Policy Sciences* and the *Journal of Environment and Development* (with K.Fisher-Vanden and R.N.Mitchell); and a major review article on integrated assessment models of global climate change, in *Annual Review of Energy and the Environment* (with K.Fisher-Vanden).

Parson holds degrees in Physics from the University of Toronto and in Management Science from the University of British Columbia and a Ph.D. in Public Policy from Harvard. He serves on the National Academy of Science's Committee on the Human Dimensions of Global Change. He has worked and consulted for the International Institute for Applied Systems Analysis, the Office of Technology Assessment of the U.S. Congress, the U.S. Environmental Protection Agency, the United Nations Environment Program, the Commission of the European Communities, Environment Canada, and the White House Office of Science and Technology Policy, where he was responsible for overseeing the completion of the US National Assessment on impacts of climate change.

Robert Stavins, appointed ENRP Faculty Chair in 1997, has been a major force in the Belfer Center's work devising and analyzing market-based instruments to tackle environmental goals, as well as other areas of environmental and resource policy. Ten years ago, at the request of U.S. Senators Timothy Wirth (D-Colo.) and John Heinz (R-Penn.), Stavins assembled and directed a team of 50 persons from academia, government, private industry, and the environmental community in a bipartisan effort — "Project 88" — which produced the report "Harnessing Market Forces to Protect Our Environment: Initiatives for the New President." The tradable permit system for acid-rain reduction, recommended by Project 88, was included in the Clean Air Act amendments of 1990.

Stavins, Albert Pratt Professor of Business and Government, became in 1999 the first Chair of the School-wide Environment and Natural Resources Faculty Group (ENRFG), which coordinates research, teaching, and outreach activities across the Kennedy School, including faculty working within five different research centers. In 2001, he established a major new university-wide initiative, The Environmental Economics Program at Harvard University (EEPHEU). Stavins has served as Chairman of the U.S. Environmental Protection Agency's Science Advisory Board Environmental Economics Advisory Committee since 1997. He is also a member of the Intergovernmental Panel on Climate Change and EPA's Clean Air Act Advisory Committee and a University Fellow at Resources for the Future.

Professor Stavins' research has focused on diverse areas of environmental economics and policy, including examinations of: policy instrument choice under uncertainty; competitiveness effects of regulation; design and implementation of market-based policy instruments; innovation and diffusion of pollution-control technologies; and depletion of forested wetlands. His current research includes analyses of: technology innovation; environmental benefit valuation; political economy of policy instrument choice; and econometric estimation of carbon sequestration costs.

In 2000-2001, Stavins and Richard Newell, an economist at Resources for the Future, have been developing a method for using limited information available during the early stages of policy development to estimate the potential gains from using economic incentives relative to other approaches to achieving environmental performance. The work is supported by the U.S. Environmental Protection Agency. The degree of heterogeneity among sources in their marginal costs of pollution abatement may be the single most important factor affecting the relative cost of market-based versus conventional environmental regulations. The researchers seek to develop practical guidance — an intuitive "rules-of-thumb"— for policy makers about the potential cost savings from using tradable permits or corrective taxes, rather than conventional policy

instruments. Decision-makers need to know when to pursue the development of market-based instruments, since these instruments are not appropriate for all problems in all circumstances, and significant political costs may be involved in their pursuit. The project's rules-of-thumb will help decision-makers with minimal data at their disposal.

Building upon previous econometric analysis and simulation modeling, Stavins has been working on a new econometric/simulation research project, in collaboration with Andrew Plantinga of Oregon State University, and Ruben Lubowski, an '01 Ph.D. in Political Economy and Government at Harvard. This work is supported by a three-year grant from the U.S. Department of Energy. In addition, Stavins is engaged in a related two-year project for the Pew Center on Global Climate Change, which frames the carbon sequestration analysis within the larger subject of global climate change policy, describes the analysis and its results, and highlights the implications of this work for public policy and for ongoing research by economists and others.

In the new project, an econometric analysis of land use in the forty-eight contiguous United States will be carried out and the results employed to estimate the carbon sequestration supply function. By estimating the opportunity costs of land on the basis of econometric evidence of landowners' actual behavior, this approach circumvents many of the shortcomings of previous sequestration cost assessments. By conducting the first nationwide econometric estimation of sequestration costs, endogenizing prices for land-based commodities, and estimating land-use transition probabilities in a framework that explicitly considers the range of land-use alternatives, this study will provide the best available estimates of the true costs of large-scale carbon sequestration efforts. In this way, it will add significantly to public understanding of the costs and potential of this important strategy for addressing the threat of global climate change. The analytical framework was presented at the annual meeting of the Allied Social Sciences Associations in New Orleans in January 2001.

Stavins continued to work with Research Associate Robert Hahn on the economic implications of the Kyoto Treaty. Virtually all design studies and many projections of the costs of meeting the Kyoto targets have assumed that an international greenhouse gas trading program can be established that will minimize the costs of meeting the treaty's goals. Stavins and Hahn have continued to raise doubts that such a trading regime will be easy to implement.

In a 2000 paper, *What Has the Kyoto Protocol Wrought? The Real Architecture of International Tradeable Permit Markets*, they pointed out that costs can be minimized if all countries use domestic tradable permit systems to meet their national targets and allow for international trades. But this is an unlikely outcome. Instead some countries will use non-trading approaches, such as carbon or greenhouse gas taxes or fixed quantity standards. Establishing an international trading regime will require some form of project-by-project credit program, and such a program will significantly raise transaction costs.

Finally they observed that there is an important trade-off between the degree of foreign sovereignty and the degree of cost effectiveness. If individual nations are allowed to choose their own domestic reduction options then those choices may limit the cost-saving potential of an international trading regime. Increased attention by policy makers to the threat of global climate

change has brought with it considerable interest in the possibility of encouraging the expansion of forest area as a means of sequestering carbon dioxide. The marginal costs of carbon sequestration or, equivalently, the carbon sequestration supply function, will determine the ultimate effects and desirability of policies aimed at enhancing carbon uptake. In particular, marginal sequestration costs are the critical statistic for identifying a cost-effective policy mix to mitigate net carbon dioxide emissions.

Stavins' research has also focused on environmental technology innovation in the energy field. For three years, a Stavins-led team, funded by the U.S. Department of Energy, has been studying econometrically the factors affecting the nature, rate, and direction of innovation in energy-efficiency technology. An article appeared in the summer edition of *Quarterly Journal of Economics* by Richard Newell, Adam Jaffe, and Robert Stavins, titled "The Induced Innovation Hypothesis and Energy-Saving Technological Change." In 1998, the team received a new grant from the U.S. Department of Energy to expand its research to the invention and diffusion of energy-efficient technology.

Stavins is also working with Kennedy School Public Policy Ph.D. student Sheila Cavanagh and Professor Michael Hanemann of the University of California, Berkeley on a multi-year project analyzing alternative policy instruments for managing urban water supplies. The project, Urban Price and Non-Price Demand Management in U.S. Urban Water Markets, funded by the National Science Foundation, examines the potential of prices and price structures to influence water consumption in the urban residential sector. Their research team has been comparing the water conservation potential and cost-effectiveness of price and non-price demand management tools in a framework similar to the comparison of market-based instruments vs. standards for pollution control.

Drawing on newly available data on residential end-uses of water in multiple U.S. cities, which disaggregate household water uses within total metered consumption, they examine the component end-uses of water, and compare end-use responses to price and non-price instruments. The research team will estimate the portion of cross-city variation in price elasticity that is due to factors beyond the control of policymakers, such as income and family size, as well as that portion that can be highly sensitive to policy, such as appliance choice. In doing so, the project will provide a useful approximation of the magnitude of water conservation achievable through reasonable price and non-price policies in the urban residential sector.

More broadly, Stavins has written a chapter for the new *Handbook of Environmental Economics* on "Experience with Market-Based Environmental Policy Instruments," and has co-authored with Richard Newell and Adam Jaffe a chapter for the same book on "Technological Change and the Environment." In addition, with Sheila Cavanagh and Robert Hahn, Stavins wrote "National Environmental Policy During the Clinton Years," a working paper released in June of 2001. And he has written "Economic Analysis of Global Climate Change Policy: A Primer," for the forthcoming *Climate Change: Science, Strategies, and Solutions*, to be published by the Pew Center on Global Climate Change.

In addition, Stavins co-edited with Paul Portney the new edition of *Public Policies for Environmental Protection*, which includes a new chapter by Stavins on “Market-Based Environmental Policies.” Also, Stavins authored *Environmental Economics and Public Policy: Selected Papers of Robert N. Stavins, 1988-1999*, published in 2001 by Edward Elgar Publishing, Inc., and he edited the fourth edition of *Economics of the Environment: Selected Readings*, published in 2000 by W. W. Norton & Company.

VISITING SCHOLARS

Robert Kates is a Visiting Research Scholar and co-investigator of the Sustainability Systems project. In that role he helped organize the Friibergh Workshop on Sustainability Science, co-authored the report of the workshop (*Science* 292:641-642) and is a co-convenor of an initiative on Science and Technology for Sustainability. As part of the research team for the Sustainable Systems project he directs research on major trends and transitions affecting sustainability. He also serves as chair of the Coordinating Committee on a Transition toward Sustainability to advise the Presidents of the U.S. National Academies on their role in advancing the recommendations of the National Academy of Sciences report, *Our Common Journey: A Transition toward Sustainability*. In these various roles he gave presentations on sustainability science at the National Conference on Science, Policy, and the Environment, The 8th Woodlands Conference: Corporate Capabilities and Tools - Making Sustainability Work in the 21st Century, at the Association of American Geographers annual meeting, the Yale School of Forestry and Environmental Sciences Centennial series, and the annual meeting of the National Academy of Sciences. He continues as an executive editor of *Environment* magazine, as co-PI on the Association of American Geographers research project on Global Change in Local Places and published papers on climate change and adaptation.

Rasmus Rasmusson produced during the fall of 2000 and early 2001 with a team of Harvard and Tufts students a report on how developing countries could increase their engagement in implementing the Montreal Protocol for phasing out ozone-depleting substances. The Report was issued in early March 2001, based on an inquiry with more than one hundred so-called National Ozone Units in the developing world, and in countries in economic transition. The Report included a theory on how ownership of an environmental convention can be strengthened. It was introduced at World Bank Headquarters and at the Executive Committee of the Multilateral Fund of the Montreal Protocol, having policy implications for these actors. These introductions were met with interest and approval.

Rasmusson after this returned to his regular occupation as environmental negotiator with the Swedish Ministry for Foreign Affairs. The Report has since been submitted to the Commission of the European Union, the OECD Development Assistance Committee, and the Secretariats of other environmental conventions.

SENIOR RESEARCH FELLOWS

Robert Corell is a Senior Research Fellow and a Senior Fellow at the Atmospheric Policy Program of the American Meteorological Society. Prior to these appointments in January 2000, he was Assistant Director for Geosciences at the National Science Foundation, where for over

twelve years he had oversight for the Atmospheric, Earth, and Ocean Sciences and the Global Change programs of the National Science Foundation (NSF). While at the NSF, Corell served as the Chair of the National Science and Technology Council's committee that has oversight of the US Global Change Research Program. He served as chair and principal US delegate to many international bodies with interests in and responsibilities for climate and global change research programs. He is engaged in research concerned with both the sciences of global change and the interface between science and public policy. He serves as Chair of the steering committee for the Arctic Climate Impact Assessment, an international assessment of the impacts of climate variability, change, and ultraviolet radiation increases in the Arctic region. Corell was a Professor and academic administrator at the University of New Hampshire. He is an oceanographer and engineer, having received his Ph.D., M.S. and B.S. degrees at the Case Institute of Technology and MIT. He has worked at the Woods Hole Institution of Oceanography, the Scripps Institution of Oceanography, and the University of Washington.

Charles H.W. Foster is an adjunct research associate and lecturer, now in his sixteenth year as a Kennedy School faculty member. Trained in forestry, wildlife management, water resources, geography, and environmental engineering, with cabinet level experience in Massachusetts and formerly a dean of the Yale School of Forestry & Environmental Studies and president of the W. Alton Jones Foundation, Foster specializes in natural resources and environmental policy, especially efforts to manage resources bioregionally in transboundary and transjurisdictional settings. During 2000-01, Foster completed a national survey of environmental regionalism, published three papers in the ENRP's special environmental regionalism working paper series, prepared a chapter for a forthcoming book on Atlantic Canada/New England regionalism, and authored a centennial article on non-profits in forestry for the Journal of Forestry. His special inquiry into the use of distance learning to reach non-industrial forest landowners in New England, sponsored by the Lincoln Institute of Land Policy, the US Forest Service, and the New England Governors Conference, resulted in the development of a pioneering home computer course for landowners built around a half-hour "walk" through a New England woodlot. In addition, Foster and Karen Filipovich persuaded the National Park Service and the Appalachian Trail Conference to advance their concept of the 2100 mile Appalachian Trail corridor serving as an environmental monitoring, early warning system for much of the settled east. During the fall term, Foster and Taubman Fellow James N. Levitt offered ENR 522m, Innovation and Entrepreneurship for Conservation and the Environment. Nineteen graduate students and environmental professionals enrolled in the course, capping their educational experience with a School-wide, half-day colloquium, Three Great Ideas from Conservation History, held in December 2000. Derived from the colloquium and the course will be a fourth white paper, Reawakening the Beginner's Mind: Innovation in Environmental Practice, a set of guidelines for environmental professionals scheduled for publication in June 2001. Foster's work next year will focus on the creation of one or more "centers of excellence" to encourage grass-roots, participatory, self-reliant, interdisciplinary, and inter-jurisdictional regional environmental actions throughout the United States and Canada.

Robert A. Frosch is a Senior Research Fellow. He serves as a participant and advisor on the Global Environmental Assessment and Sustainability Systems projects, and participates in the Managing the Atom and Energy seminars. He also serves as Vice Chair of the Report Review

Committee of the National Academies, and as a frequent Reviewer and Monitor of National Academies reports.

Mary Graham is a Joint Fellow of the Taubman Center, the Environment and Natural Resources Program, and the Harvard Information Infrastructure Project. Ms. Graham is a lawyer and writer, and the author of *The Morning After Earth Day*, a Governance Institute/Brookings book on U.S. environmental policy published in May, 1999. During the past academic year, Graham's research focused on the effectiveness of information programs in stimulating environmental improvements.

William Haney, Research Fellow, is one of the nation's leading young environmental business entrepreneurs. Over the past decade, he has started over five new environmental technological firms. He serves on the boards of the World Resources Institute and the World Wildlife Fund and he actively advised various federal agencies on technology policy. While in residence at ENRP in 1998-99, he focused on sustainable development and biodiversity. In the Fall, he organized and hosted a widely popular session with John Adams, Cofounder and Executive Director of the Natural Resources Defense Council, on "Kyoto, Buenos Aires and Beyond: A Pragmatist's View of How Washington Politics Affects Global Environmental Issues."

Cheryl Holdren is a Senior Research Fellow. Her research is on agricultural pest control, pesticide policies, and the ecological consequences of chemicals and pesticides. She is revising her book, *Toxics A to Z*, originally published in 1991. The book, which she co-authored, examines and explains the science concerned with toxic substances. A primary thrust of the book is to provide lay readers with an understanding of critical concepts, such as risk assessment, health and environmental effects of toxics, and the distribution and fate of toxics in the environment, that provide the underpinnings of U.S. policy regarding toxic substances.

SENIOR RESEARCH ASSOCIATE

Nancy Dickson is a Senior Research Associate. Her interests focus on institutional arrangements and processes for facilitating more productive interactions among the research, assessment and decision making communities involved in problems of environmental change and sustainable development. She has conducted research on the long term evolution of social response to global environmental change, most recently co-editing the book *Learning to Manage Global Environmental Risks* (MIT Press 2001), co-authoring eight chapters in it on topics ranging from the role of the media to the evaluation of research and assessment programs. Dickson is Associate Director of the Global Environmental Assessment project, an effort to understand the relationships among science, assessment, policy and management in social responses to global environmental change. She is Executive Director of the Research and Assessment Systems for Sustainability Program, which seeks to contribute to the strategies with which the next generation of national and international global environmental change programs might more effectively integrate and support its research, assessment and decision-support activities relating to global change and sustainable development. She recently co-authored an article on Sustainability science (*Science* 292:641-642) and is assisting in the development of an initiative on Science and Technology for Sustainability.

ASSOCIATE RESEARCH DIRECTOR

Karen Filipovich is interested in how institutions, scientific information and collaboration further environmental policies. She managed a team investigating Russian capacity to engage in international carbon transfers to reduce the threat of climate change. The researchers focused on the power sector and the forestry sector, seeking to better understand the opportunities and obstacles to international carbon trading in the Russia. She also organized a high-level international workshop that allowed participants to share their views on Russian carbon trading. She worked to promote data integration and environmental monitoring for the Eastern U.S., using the Appalachian Trail as a focus for activity. In October, she chaired a meeting of New England participants interested in regional scale environmental monitoring. She also is interested in the environmental impacts of new technologies, and is participating in research on the rise of distributed generation and its potential environmental impacts. Finally, she is engaged in research to evaluate debt-for-nature swaps, and working to develop a new generation of debt-for-sequestration swaps.

RESEARCH FELLOWS

Frank Alcock is a pre-doctoral Research Fellow working on the Global Environmental Assessment Project. He is a Ph.D. candidate in the Political Science Department at Duke University. His research interests include international relations theory, global environmental politics and the political economy of natural resource industries. In addition to completing his dissertation-related research on intra-industry conflict and bargaining in North Atlantic fisheries, he is conducting research for the Sustainability Systems Project on the institutional dimensions of science-policy relationships in North Atlantic fisheries. Prior to attending Duke, he spent over five years at the U.S. Department of Energy as a policy analyst/economist. He has a B.A. in Economics from SUNY-Binghamton and an M.A. in International Affairs from George Washington University.

David Cash is a Research Fellow working on the Sustainability Systems project. He completed his Ph.D. in Public Policy at Harvard's Kennedy School of Government. His thesis was entitled, "Integrating Information and Decision Making in a Multi-Level World: Cross-Scale Environmental Science and Management." His research explores the interaction of science and the negotiation and development of environmental policy for a range of issues including climate change, biodiversity, and food security. His current work explores how to effectively build and maintain research, assessment, and decision support systems for addressing issues of sustainability. As part of the Global Environmental Assessment project, he has focused on how scientific assessment of global environmental risks are linked to local decision making and local environmental risk management, with specific interest in how information and decision making systems can best support the management of cross-scale environmental risks. He is a contributing author of two GEA volumes that explore the institutional dimensions of environmental assessment and principles for designing effective assessments.

Sheila Cavanagh completed her fourth year as a Ph.D. student in Public Policy at the Kennedy School of Government during 2000-2001. Her dissertation research focuses on the effectiveness of various policy instruments in managing urban water scarcity, in the context of the uncertain effects of global climate change on regional water supplies. Sheila's work in the Environment and Natural Resources program also involves the finance of environmental infrastructure, especially municipal services like drinking water distribution and wastewater collection systems, in low-income communities and transition economies. Prior to entering the Kennedy School, she received a Masters in Public Affairs from the University of Texas at Austin and a B.A. with High Distinction in Political and Social Thought from the University of Virginia. For the 2000-2001 academic year, Sheila was the Kennedy School's Joseph Crump Fellow. She is currently a Pre-doctoral Fellow, Belfer Center for Science and International Affairs and Environmental Economics Program at Harvard University, 2001-2002. Her dissertation research for 2001-2003 is supported by a National Science Foundation grant, received with Professor Robert N. Stavins of Harvard and Professor W. Michael Hanemann of the University of California at Berkeley.

Aarti Gupta is a pre-doctoral Research Fellow working with the Global Environmental Assessment project. She is a Ph.D candidate in the Department of Forestry and Environmental Studies at Yale University. Her dissertation, to be completed in September 2001, is entitled: "Global Governance of Biotechnology: The Intersection Between Science and Politics." Her GEA research examined the role for science in framing newly emerging global governance challenges, such as safe use of biotechnology, where there are extreme normative and scientific conflicts over risk. She analyzed the transnational-national link in governance of technological change, through examining the relevance of global biosafety rules for biotechnology decision-making in India. She is a contributing author to two GEA volumes that explore the institutional dimensions of scientific input into global environmental decision-making, and the role of globalized and localized knowledges in environmental politics.

Bernd Kasemir is a post-doctoral Research Fellow working with the Global Environmental Assessment project. His research focuses on the use of sustainability assessments for practitioners in the financial industry, especially pension fund investors. Kasemir studies how pension fund investors use their power as major shareholders to put long-term sustainability onto the agenda of corporate management. He is a contributing author to a GEA volume that explores principles for designing effective assessments.

Myanna Lahsen is post-doctoral Research Fellow working with the Global Environmental Assessment project. She is an anthropologist by training. Her research focuses on the production, dissemination, and contestation of climate science within U.S., international, and Brazilian scientific and political institutions. Through ethnographic methods, she has analyzed U.S. controversies involving climate science, relating the controversies to tensions rooted in socio-cultural transformations in science and society since the Second World War. Her work explores "North-South" relations and other geopolitical dimensions of the climate issue through a focus on knowledge cultures. It looks at the impact of globalizing processes on scientific and political Brazilian actors' environmental understandings and policy preferences, and on the ways in which dominant policy frameworks related to the global environment connect or conflict with other socio-political and environmental agendas in the Brazilian context.

Marybeth Long is post-doctoral Research Fellow working with the Global Environmental Assessment project. Her research examines the intersections of science and environmental politics for issues such as desertification, whaling, and climate change. She is co-editor, with Sheila Jasanoff, of a GEA volume on local knowledge and environment-development politics. The case study she is authoring for this book concerns controversies over the right of the Makah tribe in Washington State to practice whaling. Long is a contributing author to a GEA volume on designing environmental assessments. The chapter she is co-authoring with Alastair Iles examines how different ways of framing climate change impacts shape and are shaped by methodologies and participation in assessment processes. Her paper, "A Paradox of Virtue?: 'Other' Knowledges and Environment-Development Politics" will be published in the August 2001 issue of *Global Environmental Politics*. The article analyzes "traditional knowledge" as an increasingly important concept in environment-development policymaking and explores unsettled questions regarding varied meanings of traditional knowledge, who speaks for it, and methods for its systemization.

Laszlo Pinter is a Practitioner Fellow working with the Sustainability Systems project. He is a doctoral candidate at the School of Forestry and Natural Resources at the University of Minnesota, a Senior Project Manager at the International Institute for Sustainable Development, and a consultant with the Division of Early Warning and Assessment of the United Nations Environment Programme (UNEP). His dissertation is on, "Making Global Integrated Environmental Assessment and Reporting Matter." His work deals with information and information systems and their role in policy planning, performance measurement and integrated assessment in the context of sustainable development. His research focused on the design of global scale, regionally differentiated environmental assessment and reporting systems, using UNEP's Global Environment Outlook (GEO) as a working example. He is interested in how effectively global assessment and reporting systems handle the complexity arising from the need to address sustainability issues across spatial scale, economic sectors, environmental themes and overtime.

Bernd Siebenhüner is a post-doctoral Research Fellow working with the Global Environmental Assessment project. He is also a research scientist at the Institute on Corporate Environmental Management at the Department of Economics at the Martin-Luther-University Halle-Wittenberg in Germany. He holds Masters degrees in Economics and Political Science from the Free University in Berlin and a Ph.D. in Economics from the Martin-Luther-University Halle-Wittenberg. His dissertation is entitled, "Theories of Human Behavior in Economics in the Context of Sustainability." His research addresses various aspects of global and national environmental policy as well as environmental education and training, and business strategies for environmental management and ecological ethics. He has been analyzing learning processes within scientific assessments in a comparative study of the Intergovernmental Panel on Climate Change and the Convention on Long-Range Transboundary Air Pollution using concepts of organizational learning. He is a contributing author to a GEA volume on the design of effective environmental assessments.

PRE-DOCTORAL FELLOWS

Nat Keohane's research focused on technological change and environmental policy. His ongoing work includes theoretical work on policy instrument choice as well as an empirical study of how electric power plants choose to control sulfur dioxide emissions under different regulatory regimes.

Ruben Lubowski is a Ph.D. candidate in Political Economy and Government at Harvard University. His graduate studies have focused on environment and development economics, and his principal research interests include land use and forest management. For his dissertation, he is conducting an econometric study of land-use changes in the United States in order to estimate the marginal costs of sequestering carbon through forestry activities. His main advisors are Prof. Robert Stavins (Harvard) and Prof. Andrew Plantinga (University of Maine). From 1992 to 1993, he was the Regional Environmental Project Officer for Latin America and the Caribbean at the United Nations Development Program (UNDP). Under the auspices of the Harvard Institute for International Development (HIID), he also spent two years in Sri Lanka conducting a socioeconomic study of the use of non-timber rainforest products by local communities. He holds a B.A. in Development and the Environment from Harvard College.

Alix Peterson Zwane is a PhD candidate in Public Policy. Her research focus is at the intersection of environment and development. Her dissertation, directed by Robert N. Stavins, is an investigation into the causes of land use change in Peru. This research is funded by the AVINA foundation. She has recently completed a paper on ways of spurring research in tropical agriculture with Michael Kremer. Alix received her B.A. from Boston University, summa cum laude, where she also received an M.A. in economics. She is also a Graduate Student Fellow at the Center for International Development at Harvard.

Lori Snyder is a second year Ph.D. student in Public Policy. Her research focuses on information-based environmental regulations such as the Toxic Release Inventory. The Toxics Release Inventory (TRI) program requires large manufacturing facilities to publicly report their annual releases of certain chemicals. Since the inception of the TRI program in 1986, reported emissions of over 300 regulated chemicals have fallen by more than 45%. During 2000-2001, Lori completed a draft working paper titled "Regulating Pollution Through Information Disclosure: Modeling Firm Response to the Toxics Release Inventory," in which she attempts to distinguish between competing explanations for the success of TRI in reducing total reported releases. In this paper, she develops a model of a profit-maximizing firm in a competitive industry and examines how different pathways of public pressure affect the firms' input, output, and emissions decisions.

Edmond Toy is a Ph.D. candidate in Health Policy, with a concentration in decision sciences. His research focuses on the environmental, energy, and safety impacts of the U.S. transportation sector. In particular, he is examining the effects of the recent growth in the popularity of light-duty trucks (including SUVs). He has a background in environmental engineering and policy. He received his Bachelors degree from Stanford and his Masters degree from MIT, and he spent several years working at Industrial Economics conducting policy analyses for EPA.

ASSOCIATES

Liliana Botcheva is a Fellow at Columbia University's Center for European Studies and is working on her dissertation entitled, "Regional Integration and Domestic Politics: The Influence of the EU on Environmental Policies in Eastern Europe." She is a former Global Environmental Assessment pre-doctoral Research Fellow. She is a doctoral student at the Department of Government, Harvard University, specializing in environmental politics and political economy. Her dissertation examines the influence of the European Union on environmental politics in East European countries.

Kent Cavender-Bares is a Research Associate at the H. John Heinz Center for Science, Economics and the Environment in Washington, D.C. He is working with William Clark on a project that will produce a report on the state of ecosystems in the United States. This report involves participation from four sectors of society: government, academia, environmental non-governmental organizations, and business. The report contains 100 indicators of six broad ecosystem categories: coastal ocean, farmlands, forests, freshwater, grass- and shrublands, and urban and suburban.

Barbara Connolly is an Assistant Professor at the Dept of Political Science at Tufts University. She has been focusing her research on international cooperation, particularly in the area of international environmental politics. Connolly is working on a comparison of how different international trade organizations balance trade and environment conflicts, and a collaborative study of how variation in how information gathering capacities are embedded within broader international institutions affects the strategic use of information in international politics.

Elisabeth Corell is a Wallenberg Fellow in Environment and Sustainability at the Swedish Institute of International Affairs (SIIA). She recently completed a two-year post doctoral position at the Department of Urban Studies and Planning at MIT (1999-2001). Her research explores the relationship between science and politics in international environmental politics, including the role of experts and non-governmental organizations, the rise of local/traditional/indigenous knowledge as a complement to scientific knowledge, and the Desertification Convention. Corell has written on freshwater disputes and environmental security. She is a coordinator in a joint Swedish Royal Institute of Technology/SIIA research project on international environmental governance and the upcoming World Summit on Sustainable Development (Johannesburg, September 2002).

Noelle Eckley is a Fulbright Fellow in Copenhagen, Denmark. Under a cooperative agreement with the University of Copenhagen, she was a visiting fellow at the European Environment Agency (EEA), working on research that explores how policymakers might best respond to early warnings about environmental risk. As part of her work at EEA, she helped to organize a collaborative workshop between the Global Environmental Assessment project and the EEA, held in March in Copenhagen. The workshop, entitled "Designing Effective Assessments: The Role of Participation, Science and Governance, and Focus," brought together a group of academics and assessment practitioners from Europe and the United States. Her research this year has also examined the role of the precautionary principle in chemicals assessment in Europe. She is a contributing author to two GEA volumes on the design of environmental

assessments and the institutional dimensions of assessment.

Alex Farrell is a Research Faculty member at the Department of Engineering and Public Policy at Carnegie Mellon University. He has a Ph.D. in Energy Management and Environmental Policy from the University of Pennsylvania. His research is on environmental economics and policy, particularly air pollution, and energy policy. Recent publications include papers on multi-lateral emissions trading, air pollution control for maritime sources, the introduction of hydrogen as a transportation fuel, an analysis of the political economy of air pollution and electricity industry restructuring in the mid-1990s in the United States, and a comparative analysis of the design of six large-scale environmental assessment processes. For the last several years Farrell has been part of the Global Environmental Assessment project. He completed a study of the differences in the assessment and policies for regional tropospheric ozone in the United States and Western Europe. He is currently editing a book entitled, *The Design of Environmental Assessments: Global and Regional Cases*.

David H. Guston is Associate Professor of Public Policy at Rutgers, the State University of New Jersey. He completed work on a special issue of the journal *Science, Technology, & Human Values* on "Boundary Organizations in Environmental Policy and Science." The issue, forthcoming in the fall, contains four articles derived from the December 1999 conference co-sponsored by the Global Environmental Assessment project at the Environmental and Occupational Health Sciences Institute at Rutgers and the University of Medicine and Dentistry of New Jersey/Robert Wood Johnson Medical School. He is a contributor to the GEA volume on the design of environmental assessments.

Peter M. Haas is a professor of political science at the University of Massachusetts at Amherst. He is the principal author of one chapter and contributing author to 4 chapters in the Social Learning Group book, *Learning to Manage Global Environmental Risks* (MIT Press 2001). He is working on a book manuscript on the evolution of multilateral environmental governance from 1972 to the present, focusing on the interplay of science and international institutions. Papers published this year include "International Pollution Control" in P.J. Simmons and Chantal de Jonge Oudraat, eds, *Managing a Globalized World* (Carnegie Foundation 2001); "Policy Knowledge and Epistemic Communities" for *The International Encyclopedia of the Social and Behavioral Sciences*, and, with Ernst B. Haas, "How I Learned to Escape Physics Envy and to Love Pluralism and Complexity" to appear in Michael Brecher and Frank Harvey, eds, *Mainstream Paradigms in International Studies: Institutionalism* (University of Michigan Press 2002).

Mark Hengen is a professor of environmental science, physics, and life science at Johnson & Wales University. He is a graduate of Yale's School of Environmental Studies. He worked with David Cash researching how information and decision making systems can best support the management of cross-scale environmental risks. He has worked for many state and municipal governments in the areas of ecosystem management and urban ecology. His research interests include social learning dynamics for a sustainable science, urban and social sustainable development policy analysis, ecotourism, and organizational dynamics and learning.

Jill Jäger is Executive Director of the International Human Dimensions Programme on Global Environmental Change (IHDP). Her collaboration during the year concentrated on three projects. Together with William Clark and Nancy Dickson, she was involved in the final editing of the book *Learning to Manage Global Environmental Risks* (MIT Press 2001). Activities in the Global Environmental Assessment Project included supervision of a fellow, as well as editing of a GEA volume on the design of assessment processes, which will draw on the lessons learned during this 5-year project. She organized a meeting held in Copenhagen in March 2001 that was jointly sponsored by the GEA project and the European Environment Agency. In the Sustainability Systems project, collaboration involved supervision of a fellow and preparation of and participation in meetings, including the Friibergh Workshop on Sustainability Science and the Airlie Workshop on Vulnerability to Global Environmental Change. She has been leading work within the project on research, assessment and decision-making systems for sustainability science.

Jeanne X. Kasperson is research associate professor and visiting scholar at the Stockholm Environment Institute (SEI) and on leave from the George Perkins Marsh Institute at Clark University. Her work on the Sustainability Systems Project focuses on the vulnerability of people, places, and ecosystems to the threats attendant on global environmental change. The vulnerability theme takes center stage in a recent volume: *Global Environmental Risk*, ed. Jeanne X. Kasperson and Roger E. Kasperson (Tokyo: United Nations University Press and London: Earthscan, 2001). She and Roger Kasperson recently coordinated the International Workshop on Vulnerability and Global Environmental Change, which convened at SEI 17-19 May 2001 with support from Clark University, the International Human Dimensions Programme (IHDP), the Land-Use/Cover Change (LUCC) project, and Sustainability Systems project. She co-authored *Climate Change, Vulnerability, and Social Justice* (Stockholm: SEI and Sida, 2001), the first publication to emerge from the new Risk and Vulnerability Programme at SEI. She is conducting research on changing values and attitudes toward the environment.

Roger Kasperson joined the Stockholm Environment Institute as Executive Director in September 2000. Prior to this, he was Professor of Geography and Director of the George Perkins Marsh Institute at Clark University. He has written widely on issues connected with risk analysis, risk communication, global environmental change, risk and ethics, and environmental policy. Kasperson has served as a consultant and advisor to public and private agencies on energy and environmental issues and has served on various committees of the National Research Council and the Council of the Society for Risk Analysis. He has been honored for his hazards research by the Association of American Geographers. From 1992-1996 he chaired the International Geographical Union Commission on Critical Situations / Regions in Global Environmental Change. He currently serves on the advisory board of the Society for Risk Analysis and the National Research Council's Board on Radioactive Waste Management. He received his Ph.D. from the University of Chicago.

Robert O. Keohane is a professor in the Department of Political Science at Duke University. He served on the Executive Committee of the Center for Environmental Solutions at Duke. Keohane advised Global Environmental Assessment Research Fellow Frank Alcock in his research on the institutional dimensions of science-policy relationships in North Atlantic fisheries.

Jonathan Krueger joined the Chemicals and Waste Management Programme at the United Nations Institute for Training and Research (UNITAR) as a Fellow in 2001. He is a contributing author to the forthcoming Global Environmental Assessment volume about the influence of institutions on international environmental affairs, with a case study on "The Prior Informed Consent Procedure for Trade in Hazardous Chemicals and Pesticides." He is also the author of "The Basel Convention and the International Trade in Hazardous Wastes" in the 2001/2002 *Yearbook of International Co-operation on Environment and Development*.

Marc Levy is Associate Director for Science Applications at the Center for International Earth Science Information Network (CIESIN) at Columbia University. At CIESIN he oversees programs concerning indicators of environmental sustainability, measures of state capacity, information tools for international environmental agreements, and other work aimed at integrating natural and social science information on the environment. His primary research interests are sustainability indicators, environment-security interactions, and environmental governance. He teaches courses on environmental policy at Columbia. In 2001 he helped produce the Environmental Sustainability Index, a collaborative effort involving the World Economic Forum and Daniel C. Esty from Yale University.

Pamela A. Matson is the Goldman Professor of Environmental Studies at Stanford University and the co-Director of Stanford's Center for Environmental Science and Policy. She is a co-investigator on the Sustainability Systems project. In that role she helped organize the Friibergh Workshop on Sustainability Science, and co-authored the report of the workshop (*Science* 292:641-642). With her group at Stanford, she has carried out a review and analysis of the use of vulnerability and other alternative concepts in the ecological literature, in fisheries and forestry literature, and in watershed resource literature. In conjunction with co-PIs, she has explored the ways in which these concepts are imbedded within (or ignored by) socially constructed views of vulnerability, and have begun to evaluate approaches by which ecological concepts can be merged with concepts as used in the risk/hazards community. To apply the conceptualizations of vulnerability arising from the Sustainability Systems effort, Matson is constructing a case study of a rapidly developing region in Mexico, building on research carried out previously under NASA, USDA, Packard Foundation, and other foundation funds. Her team is supplementing earlier data bases with information on coastal zone change, and on institutions and stakeholders of the region. This place-based study will be used as one of several cases against which to evaluate our conceptualizations of vulnerability, and around which to test ideas about approaches for research and assessment.

Matthew McKinney is the Executive Director of the Montana Consensus Council (a state program connected to the Office of the Governor) and one of the founders of the Western Consensus Council (an independent not-for-profit corporation). The organizations work together to improve the theory and practice of collaborative problem solving on natural resource and other public policy issues in the American West. While at the Kennedy School, Mr. McKinney organized the *Western State Planning Leadership Retreat* for the Lincoln Land Institute, he wrote and edited a new handbook, *Collaborative Problem Solving: Strategies for Western Legislators*, and wrote and edited a book on *The Story of Collaborative Problem Solving in the West*. Mr. McKinney earned his Ph.D. in Natural Resource Policy and Conflict Resolution from the School of Natural Resources, The University of Michigan. He has taught workshops and

academic courses on natural resource policy and public dispute resolution for several universities and organizations, and maintains an active research program on natural resource and environmental policy.

Ronald Mitchell is an Associate Professor in the Department of Political Science at the University of Oregon and has been a visiting associate professor with the Program on International Policy Studies and the Center for Environmental Science and Policy at Stanford University since summer 1999. He has a Ph.D. in Public Policy from Harvard University's Kennedy School of Government. As part of the Global Environmental Assessment Project, he is working with William Clark and Frank Alcock to co-edit a GEA volume on the conditions under which information produced by international environmental assessments influence international policy-making. *His Intentional Oil Pollution at Sea: Environmental Policy and Treaty Compliance* (MIT Press 1994) received the Harold and Margaret Sprout Award for 1995 from the International Studies Association for the best book on international environmental issues. He is currently working on a book manuscript on the strategies by which international institutions influence the behavior of states and non-state actors, looking in particular at the relative effectiveness of different policy approaches. He has published articles in *International Organization*, *Journal of Theoretical Politics*, *International Studies Quarterly*, and *Journal of Environment and Development*. He teaches courses on international relations theory, international environmental politics, and international regimes.

Susanne Moser is a staff scientist for climate change with the Union of Concerned Scientists (UCS) in Cambridge, MA. Her work as staff scientist at UCS places her at the intersection of climate change science and policy development. As part of the Global Environmental Assessment project, she works closely with David Cash and others on how scientific assessment of global environmental risks are linked to local decision making and local environmental risk management. Her specific interests are in how global change science and information can enter into scientifically informed decision-making in US coastal zone management. She is a contributing author of the GEA volume that explores the institutional dimensions of environmental assessments.

Tom Parris is a Research Scientist for ISCIENCES, LLC, and Executive Director of their Boston office. His research focuses on sustainability indicators, environmental information policy, and the role of information systems in supporting productive environmental science and public policy enterprises. Before joining ISCIENCES Parris was Harvard University's Environmental Resources Librarian. Recent efforts include Harvard Environmental Resources On-Line, the creation of an Environmental Science and Public Policy Archive, and the design of a Harvard Geospatial Data Infrastructure. Before coming to Harvard, he worked as a software engineer in support of large-scale satellite remote sensing and geographic information system applications for the Environmental Research Institute of Michigan, and as a policy analyst for the Consortium for International Earth Science Information Network. Parris was trained in mathematics and computer science at the University of Michigan, and in science, technology and public policy at Harvard University. As a contributing editor to *Environment* magazine, he authors the monthly column "Bytes of Note," a thematic review of electronic environmental information resources.

Hans-Joachim (John) Schellnhuber is Director of the Potsdam Institute for Climate Impact Research in Germany and Visiting Research Director of the Tyndall Centre for Climate Change Research in the UK. He is also Chair of the Global Analysis, Integration and Modelling (GAIM) Task Force of the International Geosphere-Biosphere Programme (IGBP). In these roles he tried to contribute to the general advancement of sustainability science within the international scientific community. Schellnhuber is also the chief organiser of the "First Sustainability Days," a symposia cluster that will take place in Potsdam in October 2001. The symposia brings together world-class scholars to address crucial topics within the general sustainability debate through focussed meetings that set the agenda for future research. One of these meetings will be dedicated to the methodologies of vulnerability research as part of the Harvard Sustainability Systems project, co-organized by Robert Corell and Wolfgang Cramer.

Eileen L. Shea is the Climate Project Coordinator for the East-West Center in Honolulu, Hawaii. Her research, dialogue and education activities focus on understanding the vulnerability of Asia-Pacific communities to changes in climate and exploring the concept of climate assessment activities as a regional climate information system on a continuing process of shared learning and joint problem-solving. She was centrally involved in a Pacific Islands Assessment of the Consequences of Climate Variability and Change. The Pacific Islands Assessment represents a regional contribution to the first U.S. National Assessment and focuses on the vulnerability of U.S.-affiliated Pacific Islands (Hawaii, Guam, American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, the Republic of the Marshall Islands and the Republic of Palau). Project-related activities this past year included the organization of a November 2000 Workshop on Climate and Island Coastal Communities that involved representatives of government, businesses, communities, public interest groups and scientific organizations throughout the Pacific and the Caribbean. In a related effort, Shea designed and directed the first "Training Institute on Climate and Society in the Asia-Pacific Region" that was conducted February 5-23, 2001.

Stacy VanDeveer is an Assistant Professor of Political Science at the University of New Hampshire. He received his Ph.D. in Government and Politics at the University of Maryland at College Park. His dissertation research focused on the influence of international environmental cooperation around the Baltic and Mediterranean seas on the development of domestic environmental policy over time. He is co-editor (with L. Anatheia Brooks) of *Saving the Seas: Values, Scientists and International Governance* (Maryland Sea Grant Press: 1997) and co-editor (with Geoffrey D. Dabelko) of *Protecting Regional Seas: Developing Capacity and Fostering Environmental Cooperation in Europe* (Woodrow Wilson International Center for Scholars, 2000). He is a contributing author of two GEA volumes that explore the institutional dimensions and design of environmental assessments.

Thomas Wilbanks is a Corporate Research Fellow at the Oak Ridge National Laboratory (ORNL) and Leader of the laboratory's Global Change and Developing Country Programs. His research is concerned mainly with responses to global environmental change, especially issues of geographic scale and of vulnerability/adaptive capacity, supported in part by internal research funding at ORNL. In the publication process are a book chapter on scale issues in integrated assessment and a paper on public involvement in the U.S. national climate change impact

assessment; and a number of presentations were made during the year, including the Ralph Hall Brown lecture at the University of Minnesota and a presentation to the Energy Modeling Forum. He and Robert Kates are completing a book manuscript based on the Global Change in Local Places project of the Association of American Geographers. During the 2000-2001 academic year, he was actively involved in Working Group II (Impacts, Vulnerability, and Adaptation) of IPCC, especially the chapter on Human Settlements; the emerging Subglobal Assessment component of the Millennium Ecosystem Assessment; the climate change programs of the U.S. Agency for International Development; the U.S.-Japan Energy Policy Dialogue; and in developing the strategic plan for an interagency U.S. government Clean Energy Technology Export program. He serves on the NAS/NRC Committee on Human Dimensions of Global Change and participated in the process of developing the new ten-year plan for the U.S. Global Change Research Program. He continues as an associate of the Global Environmental Assessment project and as a participant in the Sustainability Systems project, particularly in its activities related to vulnerability.

STAFF

Mary Anne Baumgartner joined the KSG in 2000 and is Assistant to Professor Clark and Program Assistant for the Global Environmental Assessment (GEA) Project and the Research and Assessment Systems for Sustainability Project. Prior to CSIA, Mary Anne was Marketing and Communications Manager for Yolles Partnership (Design Engineers) in London, England, The Design Partnership of Cambridge (Cambridge), Elkus/Manfredi Architects (Boston) and Graham Gund Architects (Cambridge). She previously worked at the Harvard Undergraduate Admissions Office and the Graduate School of Design. In addition to her interests in the arts and the built environment, Mary Anne is involved in alumni activities for Milton Academy and Bennington College, where she received a B.A. in History. Mary Anne is married to Michael von Arx Baumgartner of Zurich, Switzerland, a Research Fellow at Harvard's Department of Music, who is completing his Ph.D. in Musicology.

Kristen Eddy is Manager of Collaboration Technologies for the Research and Assessment Systems for Sustainability Project, as well as the Web Manager for the Global Environmental Assessment (GEA) Project. Previously she was the Manager of Electronic Media Services for the Belfer Center for Science and International Affairs (BCSIA) at Harvard University's John F. Kennedy School of Government. Prior to joining BCSIA, Kristen worked with Harvard's Environmental Information Center and the University Committee on Environment (UCE) on several of the school's online environmental resources, such as a Sustainable Development Indicators Databank, an International Environmental Policy Reference Guide, and the 1998-1999 electronic versions of the UCE's Environment at Harvard: Student Guide and Course List and the searchable/browseable database of Courses with Environmental Components. She has a B.A. from Harvard in Environmental Science and Public Policy.

Kate Kennedy is the Assistant to Henry Lee in the Environment and Natural Resources Program. She coordinates many of ENRP's activities, including the Fellows program, the Green Building Seminars, the Roy summer internships, and the program's operation and administrative activities. She graduated from Bucknell University in 1999 with a B.A. in Economics and French.

Jo-Ann Mahoney is the Events and Publications Coordinator for the Environment and Natural Resources Program. She splits her time between BCSIA and the Center for Business and Government's Harvard Electricity Policy Group, which is looking at the restructuring of the electric utility industry in the United States. Jo-Ann has a B.A. in English from Hofstra University and is currently enrolled in a Harvard master's program in Creative Writing. She writes fiction and has been a participant in the Ploughshares International Writing Seminar in the Netherlands and the Iowa Writing Festival.

Jennifer Shultis, Jennifer Shultis is the faculty assistant to Robert N. Stavins. Jennifer assists Professor Stavins with his work for CBG and other centers within Harvard University, as well as his work with various government agencies. Jennifer came to the Kennedy School in January 2000 with a background in the broadcasting industry. She studied at NYU and is currently pursuing a degree at Harvard. In her spare time, Jennifer competes her two horses, is an active orienteer, and trains to run marathons.

Michelle Von Euw is the Faculty Assistant for Professors Stephen Walt and Ted Parson. Prior to coming to the Kennedy School, Michelle was program coordinator for the Program on Law and Government at American University's Washington College of Law. A native Bostonian, she returns to the area after several years in Washington D.C. (where she interned on Capitol Hill and in the White House) and a brief stay in North Carolina (where she was a researcher for Harvey Gantt's 1996 Senate campaign). Michelle is a 1996 graduate of the George Washington University (B.A., Political Communication).

PUBLICATIONS

To review publications of the Environment and Natural Resources Program and its members, see page 219.

EVENTS

To review events of the Environment and Natural Resources Program and its members, see page 192.

Harvard Information Infrastructure Project

MEMBERS

CORE FACULTY AND STAFF

Deborah Hurley, Harvard Information Infrastructure Project Director
Lewis M. Branscomb, Director Emeritus; Aetna Professor of Public Policy and Corporate Management, Emeritus
Bonnie Burns, Harvard Information Infrastructure Project Staff Assistant and Assistant to Professors Lewis Branscomb and Harvey Brooks
Jane Fountain, Associate Professor of Public Policy
Viktor Mayer-Schönberger, Assistant Professor of Public Policy
Nora O’Neil, Harvard Information Infrastructure Project Coordinator

ASSOCIATES AND VISITORS

Mary Graham, Associate, Harvard Information Infrastructure Project
Edwin Ruh, Jr., Associate, Harvard Information Infrastructure Project

RESEARCH FELLOWS

Peng Hwa Ang, Fellow, Harvard Information Infrastructure Project
Nolan Bowie, Fellow, Harvard Information Infrastructure Project
Mary Rundle, Fellow, Harvard Information Infrastructure Project
V.K. Samaranyake, Fellow, Harvard Information Infrastructure Project
Anthony K. Tjan, Fellow, Harvard Information Infrastructure Project
Theodora Welch, Fellow, Harvard Information Infrastructure Project
Charles Wiecha, Fellow, Harvard Information Infrastructure Project

HARVARD INFORMATION INFRASTRUCTURE PROJECT

As the Harvard Information Infrastructure Project (HIIP) celebrates its twelfth year, revolutionary developments in information and communication technologies constitute a decisive global phenomenon. The burgeoning, ubiquitous information environment will have profound effects on economics, business, politics, and society. Established in 1989, the HIIP brings together insights and capabilities from throughout Harvard University and around the world, including the Belfer Center for Science and International Affairs (BCSIA) and the Center for Business and Government (CBG) at the John F. Kennedy School of Government.

The HIIP has spent the past decade laying the foundations and identifying the relevant questions of information policy around the globe. The HIIP has provided a neutral, interdisciplinary forum for addressing a wide range of emerging policy issues relating to information infrastructure, its development, use, and growth. The HIIP has significant experience in advising and assisting

private sector organizations, governmental agencies, non-governmental organizations, and academics in the development and analysis of information and communication policies.

In 2000-2001, the HIIP continued to focus on its goal of outreach, by strengthening and broadening its local ties to the Kennedy School, Harvard, and Boston-area IT business as well as its global links to the international IT community. The HIIP Research Fellows Program and the HIIP seminars are two key components of these efforts.

HIIP and its participants continued to earn widespread recognition for their work: for example, HIIP Fellow Nolan Bowie was the 2001 recipient of the Manuel C. Carballo Award for Excellence in Teaching at the Kennedy School. Professor (Emeritus) Lewis Branscomb was awarded the Vannevar Bush Award. HIIP Associate Mary Graham was elected to the Board of Directors of the John D. and Catherine T. MacArthur Foundation. HIIP Director Deborah Hurley completed her first year of a three-year term (2000-2003) as a member of the American Association for the Advancement of Science Advisory Committee on International Science. Professor Viktor Mayer-Schönberger was awarded the “*venia docendi*,” the “right to teach,” an academic honor in German-speaking countries that permits universities in those countries to nominate him for tenured full professor positions.

HIIP RESEARCH FELLOWS PROGRAM

The HIIP launched a Fellows Program in 1997, which has proved very successful. It continues to attract scholars, practitioners, and senior government officials at the leading edge of information infrastructure research and policy development. The HIIP Fellows Program was designed to encourage participation from a wide variety of nations, disciplinary backgrounds, and seniority levels. The 2000-2001 HIIP Research Fellows were: Peng Hwa Ang, Vice-Dean, School of Communication Studies, Nanyang Technological University, Singapore; Nolan A. Bowie, Adjunct Lecturer in Public Policy and Fellow, Joan Shorenstein Center on the Press, Politics and Public Policy, John F. Kennedy School of Government, Harvard University; Mary Rundle, Legal Affairs Officer, Trade and Finance Division, World Trade Organization, Switzerland; V.K. Samaranyake, Professor of Computer Science and Director, Institute of Computer Technology (ICT), University of Colombo, Sri Lanka; Anthony K. Tjan, founding Chief Executive Officer and former Executive Vice President, ZEFER Corp., United States; Theodora Welch, Ph.D. candidate, Concordia University, Canada; and Charles Wiecha, Manager, Universal Interaction Group, IBM’s T.J. Watson Research Laboratory, United States.

Mary Graham, Fellow, Taubman Center for State and Local Government, John F. Kennedy School of Government, Harvard University, and Edwin Ruh, Jr., Founder and President of Adventure Assets, were Associates of the HIIP.

Building on the foundation established during the first four years of the Fellows Program, the HIIP has accepted, for the 2001-2002 academic year, eight practitioners and scholars from Canada, Japan, South Korea, Sri Lanka, and the United States.

HIIP SEMINARS

The several HIIP seminars provide a source of input and dissemination for leading research and an excellent opportunity to bring current information policy developments and implementation to the attention of scholars, companies, and policymakers.

The HIIP Seminar recommenced for the 2000-2001 academic year, with a presentation by Stefan Brands, Senior Cryptographer, ZeroKnowledge Systems, on the topic, “Rethinking Public Key Infrastructures and Digital Certificates: Building in Privacy.” The spring semester opened with a presentation by Radia Perlman, Distinguished Engineer, Sun Microsystems Laboratories, on “Private Communication in a Public World: Challenges in Deploying PKI.” Other speakers included John Gage, Chief Researcher and Director of the Science Office, Sun Microsystems, and Fellow, Shorenstein Center on the Press, Politics and Public Policy; Venkatesh Narayanamurti, Dean, Division of Engineering and Applied Sciences, Harvard University; Anthony Tjan and Alexandre Scherer, Co-Founders, ZEFER; David Banisar, Deputy Director, Privacy International, and Senior Fellow, Electronic Privacy Information Center (EPIC); Jason Catlett, President and Founder, Junkbusters Corp.; Steven Levy, Senior Editor and Chief Technology Writer, *Newsweek*, and Author of *Crypto*, *Hackers*, and *How the Code Rebels Beat the Government—Saving Privacy in the Digital Age*; Carmelle Coté, Environmental Research Systems Institute, Inc. (ESRI); Karen Schneider, Library Administrator, Shenendehowa Public Library, Clifton, New York; Kathleen Hartford, Professor of Political Science, University of Massachusetts, and Associate in Research, The Fairbank Center for East Asian Research, Harvard University; Kennedy School faculty members David Hart and Jerry Mechling; and HIIP Fellows Peng Hwa Ang, Mary Rundle, V.K. Samaranayake, Theodora Welch, and Charles Wiecha.

The HIIP and STPP continued the Lewis M. Branscomb Lecture Series, established in 1999 in honor of Dr. Lewis M. Branscomb and in recognition of his many accomplishments and contributions to the field of science and technology. The Branscomb Lectures are held once each semester and feature senior academics and practitioners. Dr. Mary L. Good delivered the lecture, “U.S. Research Policy: A Status Report,” on December 4, 2000. Dr. Good is Donaghey Professor and Dean, Donaghey College of Information Science and Systems Engineering, University of Arkansas at Little Rock; President, American Association for the Advancement of Science; and former Under Secretary for Technology, Technology Administration, U.S. Department of Commerce (1993-97). Dr. Good’s lecture examined the question: if an ad hoc approach has seemed to serve us fairly well, do we need to reassess how we determine U.S. research policy and try seriously to develop a national policy? Dr. Good affirmed her belief that it is necessary to undertake this chore and that the “sages” of science, technology, and government need to get together to review the political realities for setting such a course. She provided an overview of the current situation, offered direction, and stated the urgency of such an undertaking. On March 22, 2001, Dr. Neal Lane delivered the lecture, “Science on Pennsylvania Avenue.” Dr. Lane is University Professor, Rice University (Department of Physics and Astronomy and the James A. Baker III Institute for Public Policy); former Science Advisor to President Clinton and Director, White House Office of Science and Technology Policy (1998-2001); and former Director, National Science Foundation (1993-1998). He shared some “lessons learned” during his time at the National Science Foundation and the White House. He also discussed the “barriers to progress” and his suggestions about what the science and technology community might do to lower these barriers.

Each year, the HIIP selects a country for special focus on its information and communication policies. In 2000, the HIIP selected the United Kingdom as the subject of consideration. Following upon events in the spring of 2000, we continued the activity on October 12, 2000, with a presentation on “Telecommunications Today: Unblocking the Highway” by Mr. James E. Graf, in cooperation with the British Consulate-General in Boston. Mr. Graf is President of British Telecom North America and spoke on behalf of Mr. Alfred Mockett, Chief Executive Officer, BT Ignite, United Kingdom. He discussed the present and future costs of pro-competitive communication policies in an increasingly global communications world. He also described British Telecom’s planned investment of approximately £4 billion over the next three years to expand backbone network and web hosting capabilities and realize ambitious local access strategies. These projects involve new city fiber networks, wireless local loop, and deployment of xDSL in the United Kingdom and across Europe as regulation permits.

The HIIP selected Japan for its 2001 country focus. In April, the HIIP hosted presentations by Mr. Takeo Shiina and Dr. Sachio Semmoto, in cooperation with the Belfer Center for Science and International Affairs and the Center for Business and Government of the John F. Kennedy School of Government and the Asia Center of Harvard University. Mr. Shiina, Senior Advisor and former Chairman, IBM Japan, delivered an address on “Japan and the World Economy” at a private luncheon co-sponsored with the Asia Pacific Policy Program of the Center for Business and Government, which was held on April 24, 2001, at the Harvard Faculty Club. The public launch of the 2001 HIIP Country Focus on Japan was held on April 30 and featured a presentation, “Towards the Rebirth of Japan: Development of Broadband Access Infrastructure,” by Dr. Sachio Semmoto, Founder, Chairman and Chief Executive Officer, eAccess Ltd. (Tokyo, Japan). Dr. Semmoto stated that one of the major reasons for Japan’s economic troubles for the past decade is the delay of the IT revolution as a result of a poor telecommunications infrastructure. He founded eAccess, which focuses on broadband services, to promote a competitive telecommunications environment. He believes that IT start-ups, such as eAccess, will become the driving force of Japan’s economic rebirth.

The HIIP also created in 1997 and organizes the Harvard University Faculty Seminar on Information Policy, which is chaired by Kennedy School Dean Joseph S. Nye. During the first two years, the theme of the faculty seminar was Information Infrastructure and Governance. The focus shifted in 1999-2000 to Information Policy and the Asia-Pacific Region and offered the opportunity to enlist the co-sponsorship of the Asia Center, Harvard University. The seminar is intended to increase cooperation and multidisciplinary activity throughout Harvard and to create networks among faculty interested in information policy issues. Faculty throughout the university have participated in the seminar and brought their expertise to bear on the interplay of information infrastructure and governance, the manner in which their fields will affect or be affected by this dynamic, and the relationships of their domains to others, both those with which they have traditionally shared borders and those with which now, due to information technology advances, they have begun or will soon begin to overlap or to share common boundaries. On November 29, 2000, the HIIP hosted a session with Michael M. Roberts, President and Chief Executive Officer, Internet Corporation for Assigned Names and Numbers (ICANN) entitled, “I Think ICANN: The US Non-profit Corporation That Would Run the Global Domain Name System.” Commentary was provided by Harvard faculty panelists L. Jean Camp, Assistant

Professor of Public Policy, John F. Kennedy School of Government, and Jonathan Zittrain, Faculty Co-Director, Berkman Center for Internet & Society, and Assistant Professor of Law, Harvard Law School.

RESEARCH ACTIVITIES, CONFERENCES, AND PUBLICATIONS

Under the energetic leadership of its Director, Deborah Hurley, the HIIP has continued to grow and take on increasingly challenging—and crucial—information issues, with an accelerating pace of seminars, conferences, publications, and teaching. Please refer to page ??? for details of HIIP members' teaching activities.

In August 2000, the HIIP announced the publication of *Internet Publishing and Beyond: The Economics of Digital Information and Intellectual Property*, edited by former HIIP Director Brian Kahin and Hal R. Varian and published by MIT Press. The rapid growth of the Internet and the World Wide Web is transforming the way information is accessed and used. New models for distributing, sharing, linking, and marketing information are appearing. This volume examines emerging economic and business models for global publishing and information access, as well as the attendant transformation of international information markets, institutions, and businesses. It provides those in the public, private, and nonprofit sectors with a practical framework for dealing with the new information markets. Topics addressed include the effects of various technological factors and market environments on pricing; the relationship among classic production costs, transaction costs, and the economic value of intellectual property; the effects of different pricing practices for telecommunications and Internet services on the pricing of information; the bundling and unbundling of information services; the changing cost structures and allocation of rights among authors, publishers, and other intermediaries; the effects of markets for complementary products and services, including advertising, on the pricing and use of information; and the policy implications of different pricing models.

The First 100 Feet: Options for Internet and Broadband Access, edited by Deborah Hurley and former HIIP Associate Director James Keller (MIT Press, 1999), went into its second printing in summer 2000. The book is the result of an HIIP research activity that focused on how best to connect homes and small businesses to the Internet. The volume, *Masters of the Wired World*, edited by Anne Leer (Financial Times Pitman Publishing, 1999), containing the chapter, "Security and Privacy: The Showstoppers of the Global Information Society," by Deborah Hurley, also went into its second printing.

The 4th Annual U.S.-Russian Investment Symposium on Financial and Direct Investment Opportunities in Russia: New Leadership—New Opportunities was held on October 5-7, 2000, at the Sheraton Boston Hotel in Boston. The event was organized in cooperation with the Belfer Center for Science and International Affairs, Financial Times Conferences, The Conference Board, U.S.-Russia Business Council, and the Harvard Information Infrastructure Project.

The HIIP held the Workshop on Advanced Communications Access Technologies: Economic and Policy Issues to Ensure Widespread Availability in Traditional High-cost Areas, on November 6-7, 2000, at Harvard University. The Harvard Information Infrastructure Project organized the event in collaboration with the Information Technology Office (ITO) of the

Defense Advanced Research Project Agency (DARPA) and the U.S. Technology Policy Working Group. The meeting was intentionally structured as a small, intensive gathering of experts. This Workshop is part of a research activity on advanced communications access technologies to develop an analytical framework for making the technological, economic and market, regulatory, and policy decisions to provide widespread availability of these advanced technologies in traditional high-cost areas. Although the original scope of the activity is directed to traditional high-cost areas in developed countries, the results of this activity will be directly applicable to both developed and developing countries, as well as relevant to both governments, whether national, state, or local, and to companies. The book resulting from the meeting will be published by the MIT Press in 2001.

The HIIP co-sponsored CFP 2001, the Eleventh Conference on Computers, Freedom and Privacy, which was held on March 6-9, 2001, at the Hyatt Regency in Cambridge, Massachusetts. Deborah Hurley served as chair of the conference.

Together with the Electronic Privacy Information Center (EPIC), the HIIP sponsored the “Policy Briefing: Emerging Cyberspace Issues—Internet Jurisdiction and Global Privacy Protection” at the National Press Club in Washington, D.C., on June 4, 2001. Recent events, such as the sale of Nazi memorabilia through Yahoo! France, have highlighted a growing realization that the Internet cannot ignore national boundaries. The first panel discussed these recent events, with a particular focus on new jurisdictional issues brought about by Internet commerce. Similarly, the application of regional data protection rules creates new challenges as countries seek to accommodate different legal regimes. The second panel discussed future prospects for global privacy protection by both legal and technological means.

The first annual Conference on Information Policy in the New Economy was organized by the HIIP. The event was hosted by Swiss Re’s Centre for Global Dialogue in Rüslikon, Switzerland, and was held on June 28-30, 2001. The topic of the 2001 conference was regulatory and policy convergence in the information economy—when, where, and how technological and business convergence may prompt the establishment of new common regulatory principles and institutions. While focusing squarely on the regulatory policy side of the debate, the conference also discussed technological and business convergence, their linkage, and the ways in which they affect the policy landscape. The participants included distinguished and influential leaders and thinkers from the worlds of information business, technology, and policy.

MEMBERS’ ACTIVITIES

In addition to the activities detailed above, HIIP staff, faculty, fellows, and associates took part in a number of outside initiatives related to HIIP’s core research and members’ individual research agendas in 2000-2001.

Peng Hwa Ang is a Research Fellow of the Harvard Information Infrastructure Project for the fall 2000 semester on a Fulbright grant. He was on sabbatical from his post as Vice-Dean, School of Communication Studies, Nanyang Technological University, Singapore.

Ang co-organized a conference in October 2000 with the RAND Graduate School, comparing the Internet with the printing press. In addition to Internet researchers, the conference also brought together scholars on Chinese, Korean, and European printing press history. Ang edited the proceedings during his HIIP fellowship. A summary paper was accepted for presentation at the Internet Society Conference 2001 in Stockholm. He gave a presentation based on the findings to the Telecommunications Department, Michigan State University, in November 2000. In October 2000, Ang presented the interim results of a study on the feasibility of a self-regulatory code of practice at a conference for Asian Internet content and service providers in Brisbane, Australia. He continued his research through the spring at Oxford University, United Kingdom, before returning to Singapore in June.

Nolan Bowie is a Research Fellow of both the Harvard Information Infrastructure Project (HIIP) and the Shorenstein Center on the Press, Politics and Public Policy. He is an Adjunct Lecturer in Public Policy at the Kennedy School of Government. Bowie served both as an Assistant Special Prosecutor with the Watergate Special Prosecution Force and Assistant Attorney General, Civil Rights Bureau, New York State Department of Law.

Bowie served on a number of advisory panels: U.S. Congress' Office of Technology Assessment (OTA); The National Academies' Computer Science and Telecommunications Board Commission on Behavioral and Social Sciences and Education (regarding digital divide and digital democracy issues); MediaSpace Project of the Media Education Foundation; Corporation for Public Broadcasting (CPB); National Telecommunication and Information Administration (NTIA); and Open Society Institute's Initiative on Democratic Participation.

Bowie is a Board Member of Citizens for Independent Public Broadcasting (CIPB) and an Advisor to the Center for Media Education (CME), the Advertising Council, Inc., and the National Center on Adult Literacy (NCAL). He has published numerous articles concerning equity and access issues.

Bowie attended the Second Globalization Forum, in Sanya City, Hainan Island, China, on January 12-14, 2001, as guest of the Foundation for Globalization Cooperation. Issues discussed included globalization theory and history, the dual role of states, the new economy, transnational companies and civil society organizations, negative impacts of globalization (focusing on gaps and digital divide issues), and the information technology revolution. In January, he began providing advice to The Boston Foundation (TBF) on its "New Economy Initiative: Using Technology to Empower Community" and was subsequently invited to join the TBF Steering Committee for this project. He participated in the Fourth International Conference of the Information Society, "Collective Action in the Face of the Digital Divide," which was held on March 2-3, 2001, in Lyons, France, and sponsored by the Institut Aspen France.

In April 2001, Bowie was a guest lecturer on comparative media studies at MIT; a panelist on "Technology, Knowledge Management and the Digital Divide" at the National Forum of Black Public Administrators Conference, Las Vegas; and a panelist and resource person for "E-Racing the Digital" at the Race in Digital Space National Conference, which was held at MIT.

On May 29-30, 2001, he participated in the Ford Foundation's Digital Media Forum, in Alexandria, Virginia, which was established by the Ford Foundation "to create a sustainable and growing collaborative community focused on media policy. It seeks to encourage greater collaboration among Ford's media policy grantees and the academic community in order to build a forward-looking agenda informed by academic research and technical expertise." The issues under review are privacy, media-metrics, policy implications of new wireless technologies, copyright and spectrum issues, and strategies for framing the public messages on issues.

Lewis M. Branscomb is emeritus Director of the Science, Technology, and Public Policy Program, and is Aetna Professor, emeritus, in Public Policy and Corporate Management. He is Principal Investigator of a number of projects in the fields of information technology policy and domestic and international science and technology policy.

Bonnie F. Burns is a Staff Assistant for the Harvard Information Infrastructure Project, as well as Faculty Assistant to Professors Lewis Branscomb and Harvey Brooks.

Jane Fountain is Associate Professor of Public Policy and a Faculty Affiliate of the Harvard Information Infrastructure Project and the Taubman Center for State and Local Government at the Kennedy School and the Organizational Behavior Program at Harvard University. She is a member of the American Political Science Association, the Association for Public Policy and Management, and the Academy of Management. Fountain continues to serve on the research advisory board of the Internet Policy Institute, based in Washington, D.C.

During the 2000-2001 academic year, Fountain continued her path-breaking research on the relationship between institutional arrangements and the development and use of the Internet in government and society. She authored *Building the Virtual State: Information Technology and Institutional Change* (Brookings Institution Press, 2001), a major institutional study of structural change in the nation state and its normative and political implications. The book examines three recent digital government initiatives that span a wide range of policy areas, including the development of the International Trade Data System, the U.S. Business Advisor, and the effects of digital command and control systems on military organization and battlefield management. She was invited widely to present the research findings and policy recommendations in the book at Princeton University, Ohio State University, the University of Maryland, and the National Science Foundation's annual meeting of the Digital Government Program in Redondo Beach, California.

Fountain was also a member of the Brookings Task Force on the Internet and authored a major report on the economic impact of the Internet on the government sector, "Public Sector: Early Stage of a Deep Transformation," which was presented in September 2000 at a conference organized by the Brookings Institution, the Berkeley Roundtable on the International Economy (BRIE), and the U.S. Department of Commerce. The report is published in *The Economic Payoff from the Internet Revolution* (Brookings Institution Press, 2001).

Fountain served on the executive committee for a national study of Internet voting. In December 1999, the White House directed the National Science Foundation (NSF) to conduct a study of Internet voting. The NSF funded the Internet Policy Institute (IPI) to conduct a workshop and

produce a report that would assess the feasibility of Internet voting and define an Internet voting research agenda. In October 2000, in cooperation with the University of Maryland, IPI held a workshop hosted by the Freedom Forum, which brought together computer security specialists, social scientists with expertise in elections, and election officials to address the issues related to Internet voting. The final report of this study is available at <www.internetpolicy.org>. It concludes that Internet voting from polling places is likely to be feasible in the near term and Internet voting from kiosks may be possible, but remote Internet voting from homes or offices should not be used for public elections on a wide scale until many very challenging technical and social science issues are resolved.

Fountain also serves on the Committee on Information Technology and International Cooperation for the Program on Information Technology, International Cooperation and Global Security of the Social Science Research Council (SSRC). The program was established in fall 2000 with support from the Ford Foundation. It organizes research activities—such as working groups, institutes, and policy workshops—and offers summer fellowships to graduate students and faculty. The committee works with SSRC President Craig Calhoun to set the overall intellectual direction of the program, selects fellows, and guides the formation of research networks and working groups. The committee includes a wide range of intellectual and professional perspectives.

Fountain was awarded a fellowship from the Radcliffe Institute for Advanced Study at Harvard for the 2000-2001 academic year. That fellowship culminated in the preparation of a book manuscript, *Women in the Information Age* (Cambridge University Press, forthcoming 2002). This study analyzes the participation and leadership of women in computing and information technology and reports the findings of the Women in the Information Project, which Fountain directs at the Kennedy School. The project was funded by a gift from PricewaterhouseCoopers. Fountain was invited to present her research on gender and IT at the conference on “Bridging Gender Divides,” which was organized by the Center for Education at the University of Michigan in March 2001; at Princeton University in April 2001; at the International Women’s Policy Research conference in Washington, D.C., in June 2001; and at XeroxPARC in July 2001.

Mary Graham is an Associate of the Harvard Information Infrastructure Project. Graham is a lawyer and writer and the author of *The Morning After Earth Day*, a Governance Institute/Brookings book on U.S. environmental policy published in May 1999. In fall 2000, she spoke to the American Bar Association committee on regulatory initiatives and to the Innovations in American Government meeting in Washington, D.C. Graham gave a presentation on “Information Disclosure as Risk Regulation” at the Center for Business and Government’s New Directions in Regulation Lunch Seminar on February 8, 2001.

Deborah Hurley is Director of the Harvard Information Infrastructure Project. She is a member of the Advisory Committee to the U.S. State Department on International Communications and Information Policy (and co-chair of its Working Group on Security, Encryption and Export Controls), the Advisory Committee on International Science of the American Association for the Advancement of Science, and of the Board of Directors and Advisory Board of the Electronic Privacy Information Center (EPIC).

Hurley chaired the Session on International Convention on Data Protection at the Conference on the Public Voice in Privacy Policy, which was organized by the Electronic Privacy Information Center (EPIC), Privacy International (PI), and Electronic Frontiers Italy (ALCEI) and was held at the Giorgio Cini Foundation, Venice, Italy, on September 27, 2000. She then served as Session Chair, “Smart Cards and Centralized Data Banks,” at the 22nd International Conference on Privacy and Personal Data Protection, also in Venice, Italy, on September 28-30, 2000.

Hurley’s speaking engagements from October through December 2000, included “New Technologies and their Impact on Organizational Communication,” College of Communications, Boston University, October 24, 2000; “A New Spatial Order: The Impact of Advanced Information & Telecommunication Technology in Urban Development,” Chairman’s Roundtable 2001, Lincoln Institute of Land Policy, Cambridge, Massachusetts, November 9, 2000; “The Fair Use Concept in the Information Society,” Infoethics 2000: Third UNESCO Congress on Ethical, Legal and Societal Challenges of Cyberspace, UNESCO, Paris, France, November 13-15, 2000; “Privacy,” Conference on Privacy by Design, Montebello, Canada, November 19-21, 2000; and “The Future of Ecommerce,” Leadership Council, Center for Business and Government, John F. Kennedy School of Government, December 7, 2000.

In December 2000, the volume, *Science and Diplomacy: The State of Science at the Department of State*, was published by the American Association for the Advancement of Science. Hurley contributed the chapter, “Foreign Policy in the Ubiquitous Information Environment.”

She spoke on “New Technologies, Privacy and Security” at the Workshop on Cybercrime, which was held at the Joint Research Centre, European Commission, Seville, Spain, on January 11-12, 2001.

In April 2001, Hurley was appointed as a Member of the Committee on Critical Infrastructure Protection and the Law, Computer Science and Telecommunications Board (CSTB), National Research Council, National Academy of Sciences.

She provided a radio interview, “Global Infrastructure Security as It Relates to IT,” for the Technology’s Edge Report with Dr. Cheryl Shavers, which aired on WRC AM 1260, Washington D.C., April 16, 2001.

Hurley chaired the International Telecommunication Union (ITU) Workshop on Regulatory Implications of Broadband, which was held at the ITU, Geneva, Switzerland, on May 2-4, 2001.

Hurley spoke on “Identity” at the Workshop on Personalization, Profiling and Privacy at the Media Lab, Massachusetts Institute of Technology, on May 16, 2001.

On June 8, 2001, Hurley spoke on “Government Information Policy” at the Frye Leadership Institute, organized by the Council on Library and Information Resources, EDUCAUSE, and Emory University, in Atlanta, Georgia.

Hurley gave lectures on “Egovernance,” “Ecommerce,” and “Information Technology and Policy in Kuwait,” at the Conference on Economic and Security Challenges of Globalization, organized

by the John F. Kennedy School of Government and the Kuwait Foundation for the Advancement of Science (KFAS), Kuwait City, Kuwait, on June 11-13, 2001. The activity was developed as part of the Kennedy School's new program to expand teaching and research on the critical issues facing Kuwait and the Gulf region.

Viktor Mayer-Schönberger is Assistant Professor of Public Policy and a Faculty Affiliate of the Harvard Information Infrastructure Project.

In summer 2000, Mayer-Schönberger was Distinguished Visiting Professor for Cyberlaw at the University of Regensburg, Germany.

He chaired SubTech, the world's leading, invitation-only conference on the use of technology in legal education and practice, which was held jointly at Harvard Law School and the Kennedy School of Government in July 2000.

Joining MIT Media Lab's Nicolas Negroponte, Mayer-Schönberger was a keynote speaker at the European Congress of Latin Notaries. In his speech, "Open Law," he created a blueprint for a forward-looking European information law.

In August 2000, Mayer-Schönberger joined former White House Counsel Lloyd Cutler, Markle Foundation's Zoë Baird, and best-selling author Andrew Shapiro as faculty of the Salzburg Seminar session on Cyberlaw, attracting students from more than forty nations.

Mayer-Schönberger was invited to speak at the European Forum Alpbach in September 2000 on the policy implications of information technology convergence.

In October 2000, he chaired the "Information Revolution" session of the BCSIA's "U.S.-Russian Investment Symposium," was a main speaker at a knowledge management summit in New York City, and was a speaker on the policy implications of network security and computer virus threats at WebNet 2000, the world's leading conference on the Internet and education, in San Antonio, Texas.

In November 2000, Mayer-Schönberger joined best-selling authors Charles Leadbeater and Christopher Locke at "Digital Worlds," the inaugural conference of Swiss Re's Centre for Global Dialogue in Rüschlikon, Switzerland. Later that month, he also spoke at the joint Kennedy School and National Institute of Justice Conference on "DNA and the Criminal Justice System" on the privacy aspects of the nascent DNA databases.

In December 2000, he joined a high-level group, including then USAID head Harriet Babbitt and now Deputy Secretary of Defense Paul Wolfowitz, at a meeting on "Rethinking U.S. Foreign Policy Structures," which was organized by the Carnegie Endowment for International Peace.

In January 2001, Mayer-Schönberger appeared before a sixteen-member international academic committee to present his work and was awarded the "venia docendi," the "right to teach," an academic honor in German-speaking countries that permits universities in those countries to nominate him for tenured full professor positions.

In March 2001, he spoke at the “Emerging Markets: Telecommunications” Forum in Lugano, Switzerland, as well as (via videoconference) at the Austrian Chamber of Commerce’s New Economy conference.

In April 2001, Mayer-Schönberger spoke on the Internet and jurisdictions at Yale Law School, on intellectual property at the Center for Business and Government’s Leadership Council Breakfast, and on legal entrepreneurship at the joint Kennedy School / National Entrepreneurship Commission’s Entrepreneurship Conference.

During the year, he joined the advisory boards of the Marshallplan Foundation and Evolaris, Central Europe’s preeminent Ecommerce Competence Center.

Nora O’Neil is Coordinator of the Harvard Information Infrastructure Project where her responsibilities include grant administration, conference organization, and publication management. O’Neil manages the HIIP Research Fellows Program.

Edwin Ruh, Jr. is an Associate of the Harvard Information Infrastructure Project. His primary research includes capital formation on the Internet and the secondary democratization effects on the four modalities: market, norms, law/regulation, and architecture/code as they intersect the public, private, and nonprofit sectors. Ruh is also founder and president of Adventure Assets <www.adventas.com>.

Mary Rundle, a Research Fellow of the Harvard Information Infrastructure Project, was on leave from the post of Legal Affairs Officer, Trade and Finance Division, World Trade Organization. She concentrated on policy issues surrounding electronic money, including how the market is driving electronic payment mechanisms, implications of new financial services, and responses of policymakers in e-commerce and e-finance. Rundle’s research draws on interviews conducted with technologists, entrepreneurs, investment bankers, and government officials from the world’s technological, capital, and policy centers. Her paper, “Electronic Money: Government at a Loss,” offers an overview of the challenges posed to governments and provides recommendations for improving the policy process to accommodate changes wrought by electronic money. Other papers she worked on while at HIIP include “The Treatment of Electronic Commerce in the WTO” and “Self-Regulation and the Public Interest.”

Vanniarachchige Kithsiri Samaranayake is a Research Fellow of the Harvard Information Infrastructure Project. Samaranayake is Professor of Computer Science and Founder Director, Institute of Computer Technology (ICT) of the University of Colombo. He has served the Council for Information Technology (CINTEC), the leading national agency for information technology in Sri Lanka, as its Chairman for twelve years. He pioneered work in Sri Lanka on IT policy, legal infrastructure, EDI/E-Commerce, security, Internet technology, computer awareness, and IT education. He is a member of the Advisory Panel of the Asia Information Technology and Communications Program of the European Commission. He is a past President of the National Academy of Sciences of Sri Lanka and the Sri Lanka Association for the Advancement of Science.

During his period in residence at Harvard, Samaranayake presented seminars on “The Digital Divide: A Case Study of Sri Lanka” for the HIIP, “Information Technology in Sri Lanka—Current Status and Future Opportunities” at the Department of Computer Science, University of Missouri-Rolla, and “The Internet in Sri Lanka—Opportunities and Concerns” at the School of Law, University of Missouri at Columbia. He assisted the HIIP by adding links to the HIIP Gateway relating to Sri Lanka. He also initiated the preparation of a comprehensive status report on ICT in Sri Lanka and intends to use the report as a prototype for a regional report. In addition, he completed papers on the “Benefits of Internet to Rural Communities: A Sri Lankan Initiative Based on Inexpensive Solutions” (for presentation at INET 2001, June 2001) and “Human Resource Development in IT—A Case Study of Some Innovative Initiatives from Sri Lanka.”

Anthony K. Tjan, founding Chief Executive Officer and former Executive Vice President of ZEFER, a top Internet consulting firm, joined the HIIP as a Research Fellow in June 2001. Tjan is a Harvard College graduate, who received his MBA at the Harvard Business School (HBS), earning the John Lebor Fellowship for entrepreneurship. While at HBS, Tjan raised \$2 million in first round financing for ZEFER. Within two years, the company grew to 600 employees providing strategy and implementation services for Fortune 1000 clients. Since 1993, Tjan has served as a regular participant and external staff member to the World Economic Forum (WEF). He was one of 100 people worldwide named by the WEF as Global Leaders for Tomorrow. Tjan was the subject of profiles in several leading national business and technology publications including the *Wall Street Journal*, *Fortune*, *Business Week*, *CNet*, and *Industry Standard*. He served as a commentator/expert on CNN, CNBC, and MSNBC. Tjan also wrote a series of articles for *Red Herring* chronicling ZEFER’s accession as a major player in the Internet consulting field.

In December 2000, Tjan gave a presentation, with Alexandre Scherer, in the HIIP Seminar series on the “Current State and Future Trends of the Internet.” The discussion included the characteristics of winning business models that have been able to compete strongly. He also addressed the wider political implications of the evolution of the Internet. As a fellow of the Harvard Information Infrastructure Project and the Belfer Center for Science and International Affairs, Tjan is focusing his research on the expanding role of technology in emerging countries. That interest stems from a project in South America, in which Tjan and ZEFER helped transform an online directory into Columbia’s largest portal.

Theodora Welch is a Research Fellow of the Harvard Information Infrastructure Project and a Ph.D. candidate in Strategy/Policy at the John Molson School of Business, Concordia University, Montreal, Canada, and will defend her dissertation on privatization governance in the fixed-line telecommunications sector later this year. Welch brings with her an impressive wealth of experience, both academic and practical, in the policy areas of privatization, corporate restructuring, and global telecommunications. She was the recipient of the Bombardier Fellowship in Transnational Management, acted as lead consultant on several projects for the Privatization and Restructuring Group, Private Sector Development, at The World Bank, and taught courses on corporate strategy at McGill University, John Molson School of Business, and Instituto Tecnológico y de Estudios Superiores de Monterrey.

Welch devoted much of this year to data analysis for the final stages of her dissertation research on “Effects of Inter-firm Networks and Ownership on Privatization Outcomes: Testing Privatization Governance on Developing Economy Transactions in the Fixed-line Telecommunications Sector.” A central aim is to clarify the privatization-performance relationship by extending the focus on ownership structure to include network governance structure.

In addition, Welch was session discussant on the Strategy Division Program on Strategic Change at the Administrative Sciences Association of Canada Annual Meeting, on May 29, 2001. She submitted a symposium proposal, “Governing Innovation in the Biopharmaceutical, Microfinance, and Telecommunications Industries: Micro and Macro Views from Strategy, Organization Theory, and Management of Technology,” with Susan Reid, Bella Galperin, Silvia Dorado, and Rick Molz, for the Academy of Management Annual Meeting, 2001, to be held in Washington, D.C. She was awarded a grant from the Quebec Ministry of Education, Student Mobility Bursary (International Exchange Programme), for her work during 2000-2001.

Charles Wiecha is a Research Fellow of the Harvard Information Infrastructure Project on leave from IBM. He concentrated, during his 2000-2001 fellowship year, on understanding how the emerging services-oriented architecture of the Internet may trigger new or renewed intellectual property concerns. Standards that enable well-structured application-to-application web protocols, such as SOAP and UDDI, herald a new phase of the Internet, in which intermediaries offer value-added content, navigation, and other functionality. The historical balance between the rights of content creators and users may be shifting as the new services-oriented web offers both the promise of greater content reuse and the threat of greater control over the conditions of that use.

Wiecha explored these issues through auditing an intellectual property course at the Law School and in seminars he conducted during the academic year at MIT’s Internet and Telecoms Convergence Consortium, at HIIP, and at CMU’s Department of Engineering and Public Policy. In addition, Wiecha led a two-day workshop at the ACM Conference on Human-Computer Interaction (Transforming the UI for Anyone, Anywhere, Proceedings of CHI’2001) on approaches for developing end-user interfaces that can be repurposed for a greater diversity of users, interaction devices, and tasks. A paper exploring these ideas will appear in the upcoming International Conference on Human-Computer Interaction in August 2001, in New Orleans (Achieving Universal Usability through Web Services Architectures, Proceedings of HCI International, August 5-10, 2001). He will continue to explore intellectual property issues of services-oriented web technologies when he returns to IBM’s T.J. Watson Research Center, through a collaboration with Harvard’s Berkman Center for Internet & Society.

Wiecha is Manager of the Universal Interaction group at the IBM T.J. Watson Research Center and Adjunct Assistant Professor in the Engineering and Public Policy Department at Carnegie Mellon University. He returns to IBM to lead the development of new programming tools for next-generation end-user interfaces at IBM Research. During the 2000-2001 academic year, he initiated a new research effort at IBM concerned with the economic, legal, and other policy aspects of emerging web technologies.

PUBLICATIONS

To review publications of the Harvard Information Infrastructure Project and its members, see page 222.

EVENTS

To review events of the Harvard Information Infrastructure Project and its members, see page 201.

International Security Program

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Program in Information Resources Policy (Anthony Oettinger, Director)
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David Wright, Senior Staff Scientist, Union of Concerned Scientists

BACKGROUND

Since its founding in 1973, the Belfer Center for Science and International Affairs has been the home to a substantial program focused on major problems of international security. The Belfer Center's International Security Program (ISP) has rested on three pillars: a fellows program that brings to the Center pre- and postdoctoral scholars and occasional senior scholars; a vigorous publications program; and a research program aimed at producing policy-relevant work on the most important challenges to American and international security.

ISP has always embraced a broad definition of its substantive mandate, but traditional preoccupations of the program have included: security relations among the major powers, including Soviet-American relations during the Cold War and Russian-American relations subsequently; nuclear weapons, including questions of strategy, doctrine, force posture, and arms control and proliferation; America's relations with major allies, particularly NATO and Japan; American policy, power, and role in the world; and regional security in various regional contexts.

RESEARCH AGENDA AND POLICY OUTREACH

In recent years, the research and outreach activities of the International Security Program have fallen into six thematic areas. In each area, we seek to make a sustained commitment to large and important endeavors, and to build a stream of work that cumulates across time in terms of publications, activities, and individuals. The six themes that broadly governed our work during 2000-2001 are:

- I. WEAPONS OF MASS DESTRUCTION
- II. INTERNAL CONFLICT

III. DEMOCRACY AND PEACE

IV. REGIONAL SECURITY

V. PREVENTIVE DEFENSE

VI. EXECUTIVE PROGRAMS FOR RUSSIA AND CHINA

In what follows, we describe the evolution of our work in each area and highlight recent activities.

I. WEAPONS OF MASS DESTRUCTION

ISP's research agenda focuses heavily on issues relating to weapons of mass destruction. It is pursuing five broad projects in this area: (1) the Soviet Nuclear Legacy: Avoiding Nuclear Anarchy; (2) Terrorism and Weapons of Mass Destruction (WMD); (3) Managing the Atom; (4) Chemical and Biological Weapons; and (5) Nuclear Nonproliferation and Nonproliferation Dialogues.

THE SOVIET NUCLEAR LEGACY: AVOIDING NUCLEAR ANARCHY

Background: Since 1991, ISP has had as one of its core concerns the fate of the Soviet nuclear arsenal. The abortive coup attempt in Moscow in August 1991 vividly raised the question of who was controlling the Soviet arsenal. The subsequent disintegration of the Soviet Union raised the question of who would inherit the Soviet nuclear arsenal. The ensuing and ongoing political instability and economic travails in Russia raised the question of the safety and security of the Russian nuclear arsenal and nuclear empire. In view of the fact that these weapons constitute the largest potential threat to the United States and its allies, and given the potential of Russian nuclear weapons and weapons-usable materials to fuel terrorism and nuclear proliferation, this is one of the most significant security issues of the post-Cold War era.

In 1996, ISP undertook the completion, publication, and promotion of its third book analyzing important dimensions of this problem: *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*. This book examined the threat that Russian nuclear weapons or weapons-usable materials might leak out of Russia; assessed the adequacy of U.S. policies aimed at reducing the threat of nuclear leakage; and made recommendations for improving U.S. policy.

The publication of this book was accompanied by a range of activities aimed at furthering the understanding of this grave problem, raising its salience in the policy debate, and promoting improved policies for addressing the nuclear leakage threat. Activities included a press briefing at the National Press Club in Washington, D.C., hosted by Senators Sam Nunn and Richard Lugar; Congressional Hearings of the Permanent Subcommittee on Investigations, Senate Committee on Governmental Affairs on nuclear leakage at which BCSIA Director Graham Allison testified; a joint meeting in Washington with the Los Alamos National Laboratory to devise a comprehensive agenda for action by the United States and other governments; a conference on Nuclear, Biological, and Chemical Weapons Proliferation and Terrorism jointly presented with Los Alamos National Laboratory and the Monterey Institute of International

Studies; and a collaborative conference in Helsinki, cosponsored by the Finnish Institute of International Affairs, the Swedish Institute for International Affairs, and the Institute for International Policy Studies (Tokyo, Japan), on *Meeting the Nuclear Challenges of the Next Century*. The book and its authors have been cited numerous times in newspaper and journal articles, and the authors were awarded the honor of a 1996 Laurel from *Aviation Week and Space Technology* for their “outstanding contributions to nuclear disarmament, controlling weapons of mass destruction, and the preservation of the Conventional Forces in Europe Treaty.”

In subsequent years, ISP has continued to address these issues through a range of products and activities, driven by the fact that the problem persists on the policy agenda and the potential dangers remain acute. BCSIA Director Graham Allison continued to speak frequently and write actively on this subject. Products included several op-eds (for example, “Nuclear Dangers,” which appeared in the *Boston Globe* on October 19, 1997, and “Why Russia’s Meltdown Matters,” published in the *Washington Post* on August 31, 1998). He also coauthored (with Karl Kaiser and Sergei Karaganov) a short monograph, *Towards a New Democratic Commonwealth*, that highlighted the dangers of loose nukes and advocated multilateral efforts to address the problem. ISP Director Steven Miller delivered a paper, “Russia, Nuclear Leakage, and the Nuclear Nonproliferation Regime,” at a meeting in Castiglione della Pescaia, Italy; this essay will be published as a chapter in the volume issuing from the conference. Miller also gave presentations that addressed dimensions of this set of issues at meetings in Geneva, Switzerland; Como, Italy; Arzamas-16, Russia; Stockholm, Sweden; Tokyo, Japan; and Tel Aviv, Israel. BCSIA Executive Director Richard Falkenrath lectured on nuclear security in Russia to several audiences in Cambridge and Washington, D.C. He also testified on this subject in Bonn, Germany, before a Parliamentary Commission of the German Bundestag.

BCSIA’s work on this subject was strengthened by the extensive efforts of STPP colleagues John Holdren and Matthew Bunn, whose work on U.S.-Russian nuclear relations, plutonium disposition, Russian nuclear cities, and nuclear smuggling (detailed elsewhere in this report) perfectly complements and augments ISP work on fissile material security in the former Soviet Union. Particularly notable in this context is their study “Managing Military Uranium and Plutonium in the United States and the Former Soviet Union,” published in the *Annual Review of Energy and Environment, 1997*, which provides the most substantial and comprehensive survey of the issue since the publication of *Avoiding Nuclear Anarchy*.

ISP also helped organize and cosponsored two international conferences that were built largely around the its work on nuclear security in the former Soviet Union. The first, a conference on “Post–Cold War Non-Proliferation and Security Challenges and Their Implications for Security in the Nordic, Baltic, and East European Regions,” was held in Parnu, Estonia, in March 1998. It drew together several dozen European and American experts to discuss this new security agenda. The second conference, cosponsored with the Jaffee Center for Strategic Studies at the University of Tel Aviv, was held in Tel Aviv, Israel, in June 1998. It focused on “Challenges to Global and Middle East Security.” The ISP work on fissile material security in Russia was extensively exposed to a large segment of the Israeli security community and policymakers (including Israeli Prime Minister Benjamin Netanyahu). Because many of the states that might benefit from nuclear leakage out of Russia are bitter enemies of Israel, this subject directly engages its vital interests, and hence the ISP work found a receptive audience. It seems likely

that further collaboration on these issues with Israeli colleagues will result from this initial interaction.

In addition, ISP supported the work of Postdoctoral Fellows working in this area. Jason Ellis, for example, undertook research that was centered on U.S. efforts to forge policies that would help address, in a cooperative fashion, the nuclear leakage threat in Russia. He completed a book manuscript on this topic. Entitled *Defense by Other Means: The Politics of U.S.-NIS Threat Reduction and Nuclear Security Cooperation*, it examines the evolution of, and the U.S. domestic politics associated with the U.S. Nunn-Lugar Program.

During the summer of 1998, Russia plunged once again into deep crisis, reinvigorating fears that political instability and severe economic distress might lead to the leakage of nuclear weapons or fissile materials out of Russia. Most who follow this issue closely believe that the winter of 1998–99 was particularly dangerous phase of this problem, as Russia’s nuclear empire struggled with especially acute financial problems. Accordingly, this set of issues remained prominently on the ISP agenda.

BCSIA’s “Loose Nukes Task Force,” formed in 1997, was meant to draw together those within the Center and in the Cambridge community with an interest in this subject. It continued to meet occasionally throughout the past several years, with its sessions normally focused on generating and assessing prescriptions that might at once be both feasible and useful. Members of the group were quite active in taking any good ideas that were generated (for example, the nuclear cities initiative) and advocating them before various policy communities in Washington and Moscow. Members of the Loose Nukes Task Force also benefit from a weekly “loose nukes” email news digest.

Activities in 2000-2001: BCSIA’s major product in this area during the 2000-2001 academic year was the monograph by Matthew Bunn, *The Next Wave: Urgently Needed New Steps to Control Warheads and Fissile Material*. It is the latest in the series of BCSIA publications, dating back to 1991, that analyzes in detail the current situation with respect to nuclear security in Russia and makes recommendations about how remaining dangers can be reduced or eliminated. This work was undertaken in the context of the Managing the Atom Project, described elsewhere in this report. Related work is described in the Managing the Atom section.

ISP continued in 2000-2001 to support research fellows working in this area. Post-doctoral fellow James Walsh served as coordinator of the Loose Nukes Working Group and investigated the US domestic politics of nuclear assistance to Russia, seeking to identify opportunities of expanding and improving US policies aimed at addressing this problem.

ISP staff (along with STPP colleagues) continued to lecture and write widely on the “loose nukes” problem; presentations were given in the last year in Moscow, Tokyo, Como (Italy), Washington, D.C., Bonn, Cambridge, and elsewhere. Graham Allison wrote on loose nukes for *Harvard Magazine* and contributed op-eds to major newspapers. Steven Miller prepared testimony under the title, “Nuclear Peril in Russia: Proliferation Threats Remain, Remedies are Possible, Action is Required,” that was subsequently delivered to Disarmament, Arms Control, and Nonproliferation Subcommittee of the German Bundestag.

The nuclear legacy left behind by the Soviet Union has turned out to be one of the persistent security problems of the post-Cold War era. It still looms high on the US policy agenda. It remains the single largest nuclear proliferation threat facing the international community. Many problems remain unresolved. Accordingly, ISP continues to give sustained attention to this issue.

TERRORISM AND WEAPONS OF MASS DESTRUCTION

Background: ISP's work on avoiding nuclear anarchy in Russia argued that there was a growing potential risk of nuclear terrorism. This proposition turned out to be one of the more contentious and controversial points raised in *Avoiding Nuclear Anarchy*. Disputation on this issue inspired ISP to undertake a more detailed and intensive look at the intersection of terrorism and weapons of mass destruction. During academic year 1996–97, therefore, ISP launched a research project on this subject. A team of ISP researchers, led by BCSIA Executive Director Richard Falkenrath and including Research Fellows Robert Newman and Bradley Thayer, set out to produce a book-length analysis of WMD terrorism. The study they conducted focused not only on the technical feasibility of NBC terrorism and unconventional means of delivery by states, but also the potential motivations of covert mass destruction attacks by states and nonstate actors.

This research effort was buttressed by complementary activities. In May 1996, BCSIA, in collaboration with Los Alamos National Laboratory, sponsored a major national conference on nuclear, biological, and chemical weapons terrorism and proliferation. This conference contributed to the passage of the Defense against Weapons of Mass Destruction Act of 1996 (also known as the Nunn-Lugar-Domenici amendment). To better understand the difficult issue of how nonstate actors might be motivated to use weapons of mass destruction, the Center sponsored a second conference, held in Santa Fe, New Mexico, in February 1997, intended to take an in-depth look at the potential motives of NBC terrorism. Cosponsored with Los Alamos National Laboratory and the Monterey Institute of International Studies, the expert-level workshop gathered together a select group of the nation's leading terrorism experts, policy analysts, and technical specialists with detailed knowledge of how to build and use weapons of mass destruction.

The research effort by Falkenrath, Newman, and Thayer resulted in the completion of the book *America's Achilles' Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack*, which was published in the spring of 1998 in the BCSIA Studies in International Security series by MIT Press. A key feature of this book is a comprehensive prescriptive agenda for the U.S. government, focusing both on how to ensure that acts of NBC terrorism and covert attack remain infrequent, and on how to respond to such acts if they do in fact occur. Over the course of 1996–97, Falkenrath also briefed the preliminary findings of this study to numerous government officials and expert gatherings, including the Federal Emergency Management Agency, the Livermore Study Group, the Nonproliferation Center of the Central Intelligence Agency, the Defense Science Board, and congressional staffs. In 1997–98, the contents and recommendations were widely disseminated through dozens of lectures, television appearances, briefings in Washington, and radio and newspaper interviews. Falkenrath also participated in the summer of 1997 in the Defense Science Board's study (sponsored by the Department of Defense) of the

terrorist threat to the United States. Falkenrath has also produced an article-length analysis of these issues, “Confronting Nuclear, Chemical, and Biological Terrorism,” which appeared in the autumn 1998 issue of *Survival*, a quarterly journal.

Subsequently, ISP continued work in this area on three tracks. First, there was substantial follow-on activity that flowed from the publication of *America’s Achilles’ Heel*. Project leader Richard Falkenrath lectured on WMD terrorism at NATO Headquarters in Brussels, Belgium, spoke on that topic to the New England Public Health Association, the National Governor’s Association, the U.S. Naval War College, and the U.S. Department of Justice, and gave presentations to conferences in Switzerland and Washington, D.C. He contributed an essay on the subject to the winter 1998/1999 issue of the quarterly, *Survival*, and wrote papers for the conference in Switzerland, and for the U.S. National Intelligence Council. Second, 1998–99 witnessed the launch of a second major project, this one focused on domestic preparedness. With financial support from the U.S. Department of Justice, this project will undertake both research and workshops aimed at assessing and improving the capacity of the United States and other industrial democracies to cope with terrorist threats and terrorist activities. Third, as noted below, the Preventive Defense Project has included a strand of work devoted to the subject of “catastrophic terrorism.” This work has resulted in both a published report and an article, co-authored by Ashton Carter, John Deutch, and Philip Zelikow, that appeared in the November/December 1998 issue of *Foreign Affairs*.

Activities in 2000-2001: This year witnessed the launching of a major new initiative, The Executive Session on Domestic Preparedness, under the leadership of Richard Falkenrath. The Kennedy School and the U.S. Department of Justice created the Executive Session on Domestic Preparedness to assist the government in examining the technical, legal, operational, and bureaucratic issues associated with preparing America for terrorism. The Executive Session focuses on preparedness for domestic terrorism, with particular emphasis on the possibility of a terrorist attack involving a weapon of mass destruction.

Because domestic preparedness for terrorism requires expertise that goes far beyond the capability of any single organization, the Executive Session convenes a multi-disciplinary task force of leading practitioners from state and local agencies, senior officials from federal agencies, and academic specialists from Harvard University. The members bring to the Executive Session extensive policy expertise and operational experience in a wide range of fields – emergency management, law enforcement, national security, law, fire protection, the National Guard, public health, emergency medicine, and elected office – that play important roles in an effective domestic preparedness program. The project combines faculty research, analysis of current policy issues, field investigations, and case studies of past terrorist incidents and analogous emergency situations. Through its research, publications, and the professional activities of its members, the Executive Session intends to become a major resource for federal, state, and local government officials, congressional committees, and others interested in preparing for a coordinated response to acts of domestic terrorism.

The Executive Session held its inaugural meeting at the Kennedy School on December 2-4, 1999, and its second meeting on June 26-28, 2000. Both meetings focused on conceptualizing the challenges and opportunities of domestic preparedness.

The December Executive Session was anchored by three substantive sessions. A case study of the 1996 Centennial Olympics facilitated a discussion of threat assessment and the particular challenges associated with providing effective security for very large, high-profile events. U.S. Senator Judd Gregg (R-NH) spoke to the group, addressing the need for national priorities and a coordinated intergovernmental effort. Finally, Harvard Law Professor Phillip Heymann explored legal authority as an element of preparedness, and in doing so began to highlight the unique difficulties of responding to a biological event as opposed to a chemical event.

Several themes - event planning, threat assessment, and legal authority - continued into the June Executive Session in a particularly rich discussion of the Seattle/WTO and Washington, D.C./IMF-World Bank protests. This segment also stimulated focused discussions of the role of the press and the public and the importance of simulations. A case study on anthrax threats highlighted the distinction between chemical and biological events, and the need for unified incident command systems and intergovernmental coordination. A bioterrorism preparedness segment led to a discussion of federal, state, and local responsibilities in addition to laying out the unique difficulties of responding to a biological event. Martin Linsky, Lecturer in Public Policy at the Kennedy School, led a segment on the press which explored intergovernmental tensions while focusing on the role of the press in shaping public perceptions and policy decisions. Finally, General Meir Dagan (former head of Israel's Counterterrorism Bureau) and BCSIA Research Fellow Ariel Merari presented a paper on counterterrorism in Israel that touched on threat assessment, command and control systems, and the utility of exercises.

MANAGING THE ATOM

Background: Nuclear issues have always occupied a central place on the ISP agenda. During the Cold War, considerable attention was given to the nuclear doctrines and policies of the two superpowers, the nuclear arms control negotiations between the United States and the Soviet Union, and nuclear proliferation (including closely related dimensions of the nuclear fuel cycle). Such concerns remain very much relevant today, despite the demise of the Cold War antagonism. But the dramatically new international context demands rethinking of core nuclear issues. There is no reason to suppose that the solutions of the Cold War period will be appropriate for the new age that now exists.

This notion inspired the creation of the Managing the Atom Project, a standing research group within BCSIA. It is pursued in close collaboration with the Belfer Center's Science, Technology, and Public Policy Program and its Director, Professor John Holdren. ISP actively participates in the Managing the Atom Project, which is undertaking a thorough reassessment of key elements of both civilian and military nuclear programs in the aftermath of the Cold War. Initial priorities have included U.S.-Russia nuclear relations, international fissile material management and disposition, and nuclear non-proliferation.

Activities in 2000-2001: The collaborative activities of the Managing the Atom Project are detailed elsewhere in this report, in the section devoted to the Science, Technology, and Public Policy Program. In addition to the activities reported there, members of ISP continued to monitor developments in strategic arms control and U.S.-Russian nuclear forces. Steven Miller

gave several lectures on these topics at international conferences in Europe. Miller also delivered a paper on nuclear arms control at the United Nations to the 2000 NPT Review Conference. It was subsequently published by the UN Department for Disarmament Affairs in *Arms Control and Disarmament: A new Conceptual Approach*. STPP colleague Matthew Bunn similarly followed these issues closely and developed an analysis of future directions for strategic arms control. Graham Allison continued his work related to the ratification of START II by the Russian Duma and interacted regularly with senior Russian officials in Moscow about this issue.

CHEMICAL AND BIOLOGICAL WEAPONS

Background: ISP provides the Harvard base for the Harvard-Sussex Program on CBW (Chemical and Biological Weapons) Armament and Arms Limitation, run by the Faculty Chair, Professor Matthew Meselson. Its work has had two main focal points: the ratification of the Chemical Weapons Convention (CWC) and the criminalization of the use of CBW weapons. Both Meselson and Senior Research Fellow Marie Chevrier were active in the public education effort in support of ratification of the CWC. Meselson led an effort to secure the signatures of members of the National Academy of Sciences on a letter supporting the treaty to Senator Trent Lott (R-Miss.), and Chevrier provided expertise to editorial writers and appeared on talk radio around the country. She also lobbied Senate offices, addressed a rally at the Capitol during CWC education days, participated in strategy discussions of the Poison Gas Task Force, and worked with grassroots organizations to provide information and advice.

In the aftermath of the CWC's ratification, the project hosted a panel discussion moderated by Chevrier, "CWC Ratification and the Future of Arms Control," that featured Senator John Kerry (D-Mass.), Lori Esposito Murray, special assistant to President Bill Clinton, and Professor Meselson. Meselson also organized a working meeting on the criminalization of CBW weapons that was attended by senior international law and diplomacy experts in January 1997. The CBW Project also conducted a colloquium on CBW arms control research, new and emerging developments in the natural sciences that affect CBW policy, and international negotiations to prevent the development and use of these weapons. Colloquium speakers included Gordon Vachon, Department of Foreign Affairs, Canada; Jonathan Tucker, Monterey Institute of International Studies; Anne Harrington, U.S. Department of State; and Jessica Eve Stern, formerly at the National Security Council.

The aim of the Harvard-Sussex Program on Chemical and Biological Warfare Armaments and Arms Limitation (HSP) is to promote the global elimination of chemical and biological weapons and to strengthen the constraints against hostile uses of biomedical technologies. In 1997-98, following the U.S. Senate ratification of the Chemical Weapons Convention in April 1997, HSP focused on the implementation of the CWC and strengthening the Biological Weapons Convention (BWC) through research and education. In early 1999, the Center published the volume: *Biological Weapons: Limiting the Threat*, edited by Joshua Lederberg.

Activities in 2000-2001: The main focus this year was to continue the effort to develop and promote the adoption of an international legal instrument that would criminalize the use of chemical or biological weapons. The idea is that, under such a convention, individual leaders

would be held personally accountable for ordering any such use. A stream of activities – lectures, workshops, and so on – flowed from this priority. In addition, the program continued to sponsor a weekly colloquium on CBW issues that attracted scholars from Harvard, MIT, and Tufts and included speakers from the U.S. Departments of State and Defense, U.S. Arms Control and Disarmament Agency, the United Nations Special Commission on Iraq, and prominent scholars from research institutes and universities.

NUCLEAR NONPROLIFERATION AND NONPROLIFERATION DIALOGUES

Background: In the post–Cold War era, proliferation of weapons of mass destruction is one of the most pressing security concerns for the United States and has become a major issue in U.S. relations with its allies. ISP has sought to address the linkages between proliferation and allies by engaging in nonproliferation dialogues with colleagues from two of America’s most important allies, Germany and Japan. Thus, in 1996–97 ISP continued its ongoing series of discussions on nonproliferation issues in the U.S.-German Study Group on Nonproliferation, jointly hosted with the Research Institute of the Germany Society for Foreign Affairs in Bonn. The purpose of these talks was to facilitate high-level communication between the German and American security communities on nonproliferation, including both scholars and government officials. These meetings have been held twice a year for several years, alternating meeting sites between the United States and Germany. Topics addressed include the North Korean nuclear program and the international responses to it, the allegations about Iran’s nuclear aspirations, the role and findings of the UN Special Commission with respect to Iraq’s programs for acquiring weapons of mass destruction, the problem of fissile material security in the former Soviet Union, the threat of chemical and biological weapons proliferation, and the risk of terrorism with weapons of mass destruction.

Activities in 2000-2001: Since 1992, ISP has engaged in regular collaborations with colleagues from Japan interested in the impact of nuclear issues on U.S.-Japan relations. In February 2000, the seventh joint workshop, under the heading “U.S.-Japan Nonproliferation Dialogue,” was held in Tokyo, Japan. This was a small workshop with a delegation of leading Japanese experts on nuclear matters engaged in an intensive discussion of proliferation-related issues of relevance to U.S.-Japan relations. Topics addressed included the controversy associated with the plutonium fuel cycle, problems of nuclear waste disposal, international concerns about long-term plutonium disposition, as well as North Korea’s nuclear program and other issues that could have an effect on U.S. and Japanese security interests in Northeast Asia. In addition, under the auspices of the Managing the Atom Project, ISP collaborated in a second workshop, focused on issues of plutonium disposition, that brought BCSIA researchers together with colleagues from the Department of Quantum Physics of the University of Tokyo.

In addition, ISP continued its tradition of supporting scholars working in the field of nonproliferation. During 2000-2001, ISP’s fellows program included James Walsh, working on the factors that inhibited proliferation in instances where states chose not to acquire nuclear weapons despite possession of an active nuclear weapons program, Samina Ahmed (from Pakistan), working on the implications of proliferation in South Asia, and Hui Zhang and Evan Feigenbaum, both working on aspects of Chinese nuclear weapons policy. Also relevant was the

work of Stephen Black, former official historian of the UN Special Commission on Iraq, who was focused intensively on the lessons to be learned from the international community's struggle to cope with Iraq WMD programs; and Jordan Seng, who explored whether so-called rogue states would be deterrable if they succeed in obtaining nuclear weapons.

II. INTERNAL CONFLICT

Background: As events in places as far-flung as Bosnia, Somalia, Sri Lanka, and Rwanda have demonstrated, internal conflict is a vexing international problem and a source of enormous human suffering. It is also unfortunately commonplace, with two or three dozen internal conflicts raging in any given year; internal conflict occurs far more frequently than war between states. Accordingly, this subject looms large in ISP's work on preventing deadly conflict, which is supported by the Carnegie Corporation of New York and which operates in cooperation with the Carnegie Commission on the Prevention of Deadly Conflict.

Over the past several years, ISP has undertaken two projects, both led by former ISP Associate Director Michael Brown, that seek to examine the causes of and potential solutions to internal conflict, and that explicitly consider what instruments are available to national governments and to the international community for preventing or coping with internal conflict.

The first of ISP's projects on internal conflict was a two-year study, involving nearly every resident ISP fellow as well as a number of outside experts, that sought to explore three sets of issues: the causes of internal conflict; the ways in which internal conflicts spread beyond the borders of a single state; and the efforts of the international community to prevent, manage, or resolve internal conflicts. Specific attention was given to the question of international involvement in internal conflicts, examining the international actors who get drawn into internal conflicts, or who thrust themselves into an internal conflict, and assessing as well the instruments available to outside actors seeking to intervene.

A working group, consisting of nine members of BCSIA, several colleagues from Harvard's Olin Institute for Strategic Studies, and six scholars from outside Cambridge, was formed to address these topics. In addition, a regular speaker series on internal conflict was organized and two workshops were held to expose the efforts of the working group to critical scrutiny. The main purpose of the group was to produce an edited volume that would advance understanding of the problem of internal conflict. The group's efforts culminated in the publication of the book *The International Dimensions of Internal Conflict*, which was published by MIT Press in 1996 to laudatory reviews by the *Los Angeles Times*, *Foreign Affairs*, and *World Politics*.

ISP's second major project on internal conflict was an exploration of the policy instruments available to national governments seeking to avert ethnic conflict and minimize ethnic friction. In 1996, in collaboration with Harvard's Pacific Basin Research Center, ISP launched a project designed to examine policies pursued by Asian governments in their efforts to manage ethnic relations – a project that is, in a sense, a successor to the project and completed volume on internal conflict. The goal of this project was to produce a book that would undertake an analysis of what policies seem most effective at containing ethnic problems and preventing ethnic conflict.

The book *Government Policies and Ethnic Relations in Asia and the Pacific* was published by MIT Press in the fall of 1997. It consists of 12 case studies, each focused on a single Asian country, but carefully structured to provide the basis for comparative assessment of the impact and effectiveness of the ethnic policies of Asian governments. In its orientation, this project differs considerably from a growing number of ethnic conflict studies that examine existing or historical conflicts. The aim of this study has been to examine the instruments available to governments for averting or minimizing ethnic problems.

ISP's preoccupation with the topic of internal conflict has also influenced its wider publications program. It has encouraged, induced, or attracted numerous articles on these topics for its quarterly journal *International Security*. Many of these pieces were collected in the *International Security Reader, Nationalism and Ethnic Conflict*, published by MIT Press in 1997. Intended to serve the teaching market, this book sold nearly 2,000 copies in its first year.

Activities in 2000-2001: The next major project in this area is that undertaken by former Associate Director Michael Brown, who initiated a further research project on internal conflict, this one aimed at producing a single-authored book on the causes of ethnic conflict. This project commenced in late 1997 and so far has included extensive field research in Sri Lanka, Bosnia, and Croatia, as well as an extensive literature review. Brown's more recent research and field work focused on Pakistan, India, and Bangladesh.

During academic year 2000-2001, several ISP fellows did work that fell under this rubric. They included Brenda Shaffer, who followed internal conflicts in the greater Caspian basin and their implications for regional politics; Laura Donohue, who did detailed work – including completing a volume of legal analysis – on the impact of terrorist violence in Northern Ireland; and Ivan Arreguín-Toft, who worked on asymmetric conflicts such as might arise when outside powers get drawn into local or internal conflicts.

III. DEMOCRACY AND PEACE

Background: Another strand of ISP's work in the area of preventing deadly conflict focuses on the connection between democracy and peace. Is democracy a cause of peace? Would a democratizing world be a more peaceful world? Is the promotion of democracy an effective long-term strategy for preventing deadly conflict? For several years, ISP has had an ongoing commitment to conduct research on the relationship between democracy and peace, and, more specifically, the proposition that democracies never fight wars with one another. The apparent existence of a democratic peace has led many scholars and policymakers to claim that a world of democracies would be a world without war and that the United States should make the promotion of democracy the cornerstone of its foreign policy. BCSIA's research in this area explores the theoretical underpinnings of the democratic peace as well as its implications for U.S. foreign and security policy. During the last several years, ISP engaged in several projects that explore aspects of the connection between democracy and peace.

The first of these efforts sought to undertake a qualitative assessment of the democratic peace hypothesis and resulted in the edited volume, *Paths to Peace: Is Democracy the Answer?*, which offers a historically grounded empirical reconsideration of the democratic peace hypothesis. This approach contrasts sharply with other studies of the democratic peace, most of which rely on statistical analysis of a large sample of states and conflicts. Under the direction of Dr. Miriam Fendius Elman, a former BCSIA research fellow, a group of distinguished experts and promising younger scholars examined how domestic norms and institutions influenced decisions for war or peace in past crises. The cases selected included crises between pairs of democracies, between a democracy and a nondemocracy, and between pairs of nondemocracies. Some of these crises escalated to war and others did not. The contributors to *Paths to Peace* examined the historical record to see if democratic processes reduced the likelihood of war and if the absence of democratic norms and institutions made states more bellicose. On the whole, the authors conclude that democracy does not necessarily lead to peace. Domestic factors influence decisions to go to war, but domestic politics can make some democracies more warlike. Further, some nondemocracies may even be less likely to go to war because of the absence of public pressure on their leaders. *Paths to Peace* thus suggests that the United States should be more cautious about basing policies on the premise that spreading democracy will cause peace. The book was published by MIT Press in August 1997.

Activities in 2000-2001: Two ISP fellows made substantial contributions in this area during this year. Markus Fischer wrote a lengthy analysis, “The Liberal Peace: Ethical, Historical, and Philosophical Aspects,” which explores the underpinnings of the democratic peace hypotheses. It argues that the unfertile ground for liberalism in much of the world will limit the spread of, and possibly undermine, the democratic peace. During the year, ISP fellow Chrystia Freeland completed her book, *Sale of the Century: Russia’s Wild Ride from Communism to Capitalism*. Complementing Fischer’s more abstract work, it provides a detailed case study of the process of political and economic reform in Russia.

Two other projects represent ongoing work. One focuses on role that democracy promotion should play in U.S. foreign policy choices. In *Should America Spread Democracy? A Debate*, Sean Lynn-Jones and Christopher Layne engage in a spirited exchange of views on whether U.S. interests are advanced by U.S. attempts to promote democracy – a central issue in debates over the future of American foreign policy. Lynn-Jones, a Research Associate at BCSIA, presents the case for spreading democracy. He argues that democratic political systems benefit their citizens more than other types of political systems; the spread of democracy is likely to expand the zone of democratic peace; and America’s security and economic relations will be enhanced in a world of more democracies. Layne, formerly a BCSIA Postdoctoral Research Fellow, takes the opposite view, arguing that the democratic peace is a myth and thus U.S. policies to spread democracy will not increase international peace. In his view, U.S. policies to export democracy will not work and will divert attention from important domestic priorities. He argues that the United States should focus on its national interests instead of attempting to control the domestic politics of other countries.

Should America Spread Democracy? will stimulate and inform further public debate on this important issue in U.S. foreign policy and is expected to be an invaluable teaching tool. The

completed draft is now being revised, and the volume will be published in the BCSIA Studies in International Security series by MIT Press.

The Center's other ongoing project on democracy and peace is a study of the connection between the process of democratization and war. With BCSIA's support, Professors Edward Mansfield of Ohio State University and Jack Snyder of Columbia University are writing a book that will build on their pathbreaking and controversial summer 1995 *International Security* article, "Democratization and the Danger of War." In that article, Mansfield and Snyder argued that established democracies may enjoy a democratic peace, but states in the process of becoming democracies are more likely to be embroiled in war. The democratization process often creates nascent democracies without stable institutions. Leaders in such countries may be tempted to fan the flames of nationalism to achieve and maintain power, thereby creating a climate for aggressive war. In their book, which will be published by MIT Press as part of BCSIA's book series, Mansfield and Snyder will offer an extensive quantitative analysis of the link between democratization and war, as well as detailed case studies of democratizing states and their decisions for war or peace.

IV. REGIONAL SECURITY

Background: Many of the world's security problems manifest themselves in regional settings. With the end of the Cold War, dilemmas of regional security have become even more prominent on the international security agenda. In recent years, ISP has sought to expand and strengthen its coverage of regional security issues, in part by selection of pre- and postdoctoral fellows working on security in specific regions and in part by recruitment of distinguished senior fellows. ISP's efforts to address regional security were initially led by and centered on the activities of Senior Fellow Shai Feldman. In the first phase of his work, Dr. Feldman completed two projects that dealt with the changing security environment in the Middle East. First, he finished an extensive and comprehensive assessment of the problem of nuclear weapons in the Middle East, and of the potential arms control restraints on the nuclearization of the Middle East. This project gave rise to a book, *Nuclear Proliferation and Arms Control in the Middle East*, published by MIT Press in 1997 as part of the BCSIA Studies in International Security series. It is regarded as an essential source on that issue. Second, Feldman, along with coauthor Dr. Abdullah Toukan (Science Adviser to His Majesty King Hussein of Jordan and Head of Jordan's delegation to the Arms Control and Regional Security talks), brought to fruition an unprecedented effort to find middle ground between the Arab and Israeli perspectives on security in the Middle East. Their book, *Bridging the Gap: A Future Security Architecture for the Middle East*, published by the Carnegie Commission on Preventing Deadly Conflict (which also supported their project), has been hailed as a remarkable and historic attempt to jointly explore the most sensitive security issues in the Middle East.

ISP also has launched a strategic partnership with the Jaffee Center for Strategic Studies at the University of Tel Aviv. A first jointly activity was a large conference assessing the changed strategic environment for Israel and the United States, held in Tel Aviv in the summer of 1998. The conference report, *Challenges to Global and Middle East Security*, was published in the fall of 1998. In March 1999, the Jaffee Center and BCSIA cosponsored (with others) an

international conference on “The Future of Military Doctrine,” which examined in particular the doctrinal influences of the U.S. and Israeli militaries on each other.

Activities in 2000-2001: In 1999-2000, ISP launched a new activity, the US-Israel strategic dialogue, in collaboration with the Jaffee Center for Strategic Studies of Tel Aviv University. The essential idea is to provide an framework within which US and Israeli experts and officials can intensively discuss regional issues of mutual concern. This appeared to be particularly warranted in view of the actual or impending changes in many relevant governments (including the US and Israeli governments), the ongoing mutual concerns over the challenges posed by Iran, Iraq, the continuing worries of both governments about weapons proliferation in the region, and the momentous implications of the success or failure of the Middle East peace process. The first US-Israel strategic dialogue meeting was held in Washington DC in February 2000; it was followed by a meeting in New York in June 2000. A third meeting is scheduled for December 2000.

ISP and the Jaffee Center also worked together to facilitate the publication of *The Middle East Military Balance, 1999-2000*, which was published at the end of 1999 by the MIT Press. This Jaffee Center product is published in ISP’s monograph series, BCSIA Studies in International Security.

In addition, ISP and continued to collaborate with Dr. Shai Feldman on his latest work, focused on the diplomacy of the peace process in the Middle East, and in particular on the unofficial, or Track II, discussions that have proceeded in parallel with, and sometimes instead of, the formal negotiations between the interested parties. The goal of this exercise is, in part, to describe the evolution of the Middle East peace process. Feldman’s work also draws general lessons from the record of the Track-II talks, which have been instrumental in the Arab-Israeli conflict, and to explore the possible implications of these lessons for other regions. This project builds on Feldman’s earlier studies of arms control and the security dialogue in the Middle East.

This ongoing study evaluates the various Middle East Track-II discussions held over the past 15 years and ascertains which of these efforts succeeded and which failed. More important, the study attempts to explain Track-II successes and failures. Within this context, particular emphasis is placed on examining whether the Middle East experience in Track-II talks could be applied to reducing the risks of conflict and war in East Asia. The results of this study, with particular emphasis on policy recommendations, are being distributed widely to decisionmakers and policy elites in the United States, the Middle East, and East Asia. The research team is comprised of two Israeli scholars – Feldman and Ze’ev Schiff, defense editor of Israel’s leading daily newspaper *Ha’aretz* – and two Arab scholars – Dr. Ahmad Khalidi and Dr. Hussein Agha.

In 2000-2001, devoted attention to Northeast Asia via its fellows program. Mitsuru Nodomi from Japan examined the question of theater missile defense for Japan and its implications for regional security. Xingping Kang from China worked on US-China relations and on China’s changing interests, as a new oil importer, in the Middle East. And Hui Zhang, from China, worked on Chinese nuclear policies.

V. PREVENTIVE DEFENSE

Background: The Preventive Defense Project is a joint venture between Stanford University and Harvard University, begun during 1996–97 under the leadership of Professor Ashton Carter at BCSIA and Dr. William Perry at Stanford’s Center for International Security and Arms Control. The premise of Preventive Defense is that the absence of an imminent, major, traditional military threat to American security presents the U.S. with a unique challenge: to prevent new threats from emerging. While day-to-day crisis management preoccupies policymakers, Preventive Defense concentrates on identifying and forestalling developments that could pose new threats to U.S. vital interests. The project is initially concentrating on avoiding worst-case scenarios with Russia, dealing with the lethal legacy of Cold War weapons of mass destruction, engaging an awakening China, and countering proliferation of weapons of mass destruction and grand terrorism. The Preventive Defense Project seeks to contribute to these four objectives through intensive personal interaction with defense and military leaders around the world and through the establishment of highly informed but nongovernmental “Track II” initiatives that explore new approaches to our most pressing security problems. Among other activities, this project will produce a book on the concept of preventive defense, cosponsor a working group on grand terrorism and weapons of mass destruction, and pursue a number of initiatives in Russia, China, and other newly independent states of the former Soviet Union to address and advance key security issues.

The Preventive Defense Project pursued an ambitious agenda of activities during 1997–98, including some eighteen conferences, meetings, and workshops. Most of this activity was centered on three of its core interests: continuing interaction with Russian defense experts and officials on security issues of common interest; building relationships with the Chinese defense community; and coping with the challenge of grand terrorism. In addition, the Preventive Defense Project organized and cosponsored three major conferences on “NATO after Madrid,” “Ukraine-NATO Relations,” and “The Revolution in Business Affairs.” The project also produced a series of monographs derived from these activities, including *Catastrophic Terrorism: Elements of a National Policy* and *The Content of U.S. Engagement with China*.

In March 1999, Dr. Carter and Dr. Perry co-authored a book that prescribes a new security strategy for the United States: *Preventive Defense: A New Security Strategy for America* (Brookings Institution Press, 1999). To celebrate the book’s publication and to further communicate the policies and programs contained in it, several events were held in Washington, D.C. and elsewhere such as book signings, press gatherings, a meeting at the National Press Club, and a book party at BCSIA co-hosted by Preventive Defense and the Council on Foreign Relations where General John Shalikashvili, former Chairman of the Joint Chiefs of Staff and Senior Advisor to the Preventive Defense Project, delivered opening remarks.

Activities in 2000-2001: This year the Preventive Defense Project focused particularly on defense management. It formed a core group on Defense Organization and Management that drew together a number of experts and former officials to consider how defense management might be improved. Its efforts culminated in the publication of the book, *Keeping the Edge: Managing Defense for the Future*, co-edited by Ashton Carter and John White.

VI EXECUTIVE PROGRAMS FOR RUSSIA AND CHINA

U.S.-RUSSIAN SECURITY RELATIONS

BCSIA Board Member Robert Blackwill is the Faculty Chair of the Kennedy School's Executive Program for General Officers of the Russian Federation and the United States, an initiative sponsored by the Carnegie Corporation of New York and the U.S. Department of Defense. In the first years of the program, participation was limited to Russian generals, and the program was known as the Executive Program for General Officers of the Russian Federation. In January 1997, American generals and flag officers began to participate as well, a watershed for the project. The curriculum of the program includes U.S.-Russian relations, arms control, U.S.-Russian national security priorities in the 1990s, and preventing ethnic conflict. It is designed primarily to enhance U.S.-Russian dialogue on these topics, but also to provide participants with knowledge that will assist them in managing the current challenges faced by both militaries. Experts from BCSIA, including Graham Allison, Ashton Carter, Richard Falkenrath, and Steven Miller, have frequently contributed to the program as lecturers. Additionally, the program has been a key vehicle for the development of strong ties between the Kennedy School and Russia's national security elite.

U.S.-CHINESE SECURITY RELATIONS

BCSIA Board Member Robert Blackwill is also the Faculty Chair of the Kennedy School's Executive Program for Senior Chinese Military Officers. With the sponsorship of Harvard's Nina Kung Initiative, this program – the first of its kind in the West – began in January 1997, when 23 high-ranking military officers from the People's Liberation Army traveled to Harvard for a two-week executive program that focused on political, economic, and security developments in Asia; U.S.-China relations; and geopolitical trends. The program is taught by Harvard faculty members and leading outside specialists. Lecturers in the program from BCSIA included Graham Allison, Ashton Carter, Richard Falkenrath, Steven Miller, and Philip Zelikow. Like the Kung Initiative of which it is a critical part, the Executive Program for Senior Chinese Military Officers is a central part of the Kennedy School's strategy for strengthening its links with Chinese leaders, as well as for developing its core expertise on matters of Chinese foreign policy and national security strategy, and Asian affairs more broadly.

MEMBERS' ACTIVITIES

Steven E. Miller, Director, ISP; Editor-in-Chief. Miller's activities during academic year 2000-2001 include:

- Workshop on Spent Fuel Storage, co-sponsored by the Managing the Atom Project, BCSIA, Harvard, and the University of Tokyo, held at the University of Tokyo, Tokyo, Japan, 20 July 2000. Presentation: International Approaches to Spent Fuel Storage
- International Symposium on Nuclear Energy, co-sponsored by the Managing the Atom Project, BCSIA, Harvard, and the University of Tokyo, held in Tokyo and Tokai, Japan, 21-22 July 2000. Lecture: Nuclear Energy and International Security.
- Workshop on Scientists and International Security, sponsored by the MacArthur Foundation,

held at BCSIA, Harvard University, Cambridge, MA, 28 July 2000.

- Meeting of the Council, International Pugwash, King's College, University of Cambridge, Cambridge, England, 1-3 August 2000.
- 50th Annual Conference of Pugwash, Queens' College, University of Cambridge, Cambridge, England, 3-8 August 2000. Chaired Working Group on Political and Economic Causes of War.
- Meeting, Center for Global Partnership, The Japan Foundation, New York, 16 August 2000.
- Meeting of the IISS Council, Manila, Philippines, September 14, 2000.
- Conference on "The Powers in Asia," Annual Conference of the International Institute for Strategic Studies, Manila, Philippines, 14-17 September, 2000. Presentation: Nuclear Stability in South Asia.
- Workshop on Democratic Control of the Military in Asia, co-sponsored by IISS and the Geneva Center for the Democratic Control of the Armed Forces, Manila, Philippines, September 16, 2000.
- Conference on Offense-Defense Theory, BCSIA, Harvard, 21-22 September 2000.
- Hearing of the Subcommittee on Disarmament, Arms Control, and Nonproliferation of the Committee on Foreign Affairs, German Bundestag, Berlin, Germany, 27 September 2000. Paper: "Nuclear Peril in Russia: Proliferation Threats Remain, Remedies are Possible, Action is Required."
- Nunn/Turner meeting on Nuclear Dangers, BCSIA, Kennedy School, Harvard, 10 October, 2000. Presentation: The Nuclear Abolition Debate
- Lecture on "Is Major War Obsolete?," Security Studies Program, MIT, Cambridge, MA, 11 October 2000.
- Executive Session on Domestic Preparedness, Kennedy School, Harvard, 12-14 October 2000.
- Conference on "US-Russian Relations: Implications for the Caspian Region," Caspian Studies Program, BCSIA, Harvard, 22-23 October 2000. Presentation: Rivalry in the Caspian Basin.
- Caspian meeting, BCSIA/DGAP, Berlin, Germany, 6-7 November 2000.
- Committee on International Security Studies, American Academy of Arts and Sciences, Cambridge, MA, 10 November 2000.
- Workshop on Reducing the Risk of Conflict, Killing, and Catastrophe in the 21st Century, Committee on International Security Studies, American Academy of Arts and Sciences, Cambridge, MA, 17-19 November 2000.
- US-Israel Strategic Dialogue, sponsored by BCSIA and the Jaffee Center for Strategic Studies, Harbortowne, Maryland, 1-3 December 2000.
- Executive Program on Ukrainian National Security, December 5, 2000. Presentation: The New Missile Defense Debate in the United States
- Woodrow Wilson Center for International Scholars, Washington DC, January 5, 2001.
- Conference on The Missile Threat and Plans for Ballistic Missile Defense, organized by the Landau Network Centro Volta and the Italian Ministry of Foreign Affairs, Rome, Italy, 18-19 January 2001. Presentation: National Missile Defense: The US Debate
- Meeting, Center for Global Partnership, The Japan Foundation, New York, 25 January 2001.

- US-Japan Nonproliferation Workshop, BCSIA/ISP and the Japan Atomic Industrial Forum, Cambridge, 7-8 February 2001. Presentation: Missile Defense in the Bush Administration.
- Panel on Nontraditional Approaches to Security, International Studies Association, Chicago Illinois, 20-21 February 2001. Presentation: Comparing Traditional and Untraditional Approaches to Security Studies.
- Meeting of the Council, International Institute for Strategic Studies, London, England, 22-23 March 2001.
- Pugwash Workshop on Moving Towards the Abolition of Nuclear Weapons, New Delhi, India, 25-27 March 2001.
- Workshop on North Korea, sponsored by the Preventive Defense Project, at the Brookings Institution, Washington DC, March 30, 2001.
- Conference on “The New Security Dimensions: Europe After the NATO and EU Enlargements,” organized by SIPRI, Stockholm, Sweden, 20-21 April 2001. Presentation: What Future Role for the Transatlantic Partnership?

Ashton B. Carter. During 2000-2001, Ashton B. Carter served as the Ford Foundation Professor of Science and International Affairs at the Kennedy School of Government. In this capacity he taught a class on American National Security Policy. This course analyzes the central threats to U.S. and international security in the post-Cold War era and the policy options available to reduce those dangers. The course encompasses military, diplomatic, and intelligence functions and agencies of the U.S. government. In the spring of 2001, Dr. Carter taught a course on Controlling the Proliferation of Weapons of Mass Destruction. This course on proliferation and strategies for its control, covers the spread to state and non-state actors of nuclear, biological, chemical, ballistic missile weapons and technology, and other methods of mass destruction such as cyber attack. Beginning with a “how-to” guide to weapons of mass destruction and their effects, the course reviews theories about the spread and control of proliferation from social science literature, postwar history, and international nonproliferation norms and treaties.

Dr. Carter co-directs with William Perry the Preventive Defense Project, a research collaboration of Stanford and Harvard Universities that designs and promotes security policies aimed at preventing the emergence of major new threats to the United States. The Project concentrates on forging productive security partnerships with Russia and its neighbors, dealing with the lethal legacy of Cold War weapons of mass destruction, engaging an awakening China, and countering proliferation of weapons of mass destruction and potential acts of catastrophic terrorism. The Preventive Defense Project seeks to contribute to these objectives through invention of new policy approaches reflecting preventive defense, intense personal interaction with political and military leaders around the world, and through the establishment of highly informed but non-governmental “Track Two” initiatives that explore new possibilities for international agreement.

In 2000-2001, the Project’s primary focus was on the exploration of ways to reform the management and organization of the Department of Defense to meet the security challenges of the next century. The results of the Project’s year-long study of the U.S. government’s structural capacity to deal with the security challenges of the new era were put forth in a volume published in early 2001 by The MIT Press in order to coincide with the needs of the Presidential transition team, *Keeping the Edge: Managing Defense for the Future*. Most studies - and most

practitioners in Washington - focus understandably on threats, policy, and programs. In this study, the Defense Organization and Management's core group examined the optimal configuration of institutions, procedures, incentives and assignment of responsibilities to ensure that we can perceive threats, conceive policy, and execute programs. This bi-partisan study group was comprised of leading scholars and practitioners from the security field, including BCSIA Board members Dr. John Deutch and Dr. John White, was supported by research assistants at Harvard and Stanford, and met periodically in both Cambridge and Palo Alto. The recommendations put forth in *Keeping the Edge* are designed to inform the national security establishment, and especially DOD on how best to implement the policies the nation's leaders choose for it, to manage the programs they direct, and to anticipate and adapt to a changing world. Outreach efforts have included presentations to key policy think-tanks and leading foreign affairs experts as well as briefings to key government officials both on and off the Hill, but perhaps the most encouraging note has been the assumption by a number of the core group members of senior positions in the Bush administration.

In addition to his teaching responsibilities in 2000-2001, Dr. Carter completed his service as Special Advisor to the Clinton Administration's North Korea Policy Review in October 2000. Dr. Carter's interest and commitment to contributing to an improved situation on the Korean peninsula have continued through the Preventive Defense Project's initiative to plan a program to devise and promote a path for addressing the security threats posed by North Korea, including the possibility of direct, informal "track-two" contacts with North Korea. In March 2001, the Project convened a conference of leading U.S. scholars and experts on the North Korean question in Washington, D.C. This meeting served as a springboard for the Project's activities in this arena and ultimately led to the decision to convene a trilateral meeting of leading scholars and former government officials from the U.S., the Republic of Korea and Japan in Honolulu this past May. This meeting further informed Project principals of the nuances not only in the U.S.-DPRK dynamic, but of the existing challenges and issues in the ROK-Japan-DPRK relationship. Strongly encouraged by the participants in the D.C. and Honolulu meetings, the Project principals have resolved to pursue their goal of a "track-two" channel with the North Koreans in the months ahead. The Project is pleased that the former U.S. ambassador to the Republic of Korea, Steve Bosworth; the former Commander of U.S. Forces in Korea, John Tilelli; the former Deputy Assistant Secretary of Defense for East Asian and Pacific Affairs, Kurt Campbell; and former Undersecretary of State and U.S. Ambassador to Japan and to the Philippines, Mike Armacost have all agreed to lend their expertise to this effort.

The Project has been planning the launch of its initiative on Russia's Eastern vista. In the fall it will bring together a select and diverse group of American scholars and practitioners to discuss the logic and approach to U.S.-Russian military-to-military cooperation. Shortly thereafter the Project will convene a workshop in Europe to discuss next steps in U.S.-NATO military to-military cooperation. Additionally, the Project principals anticipate re-engaging their Chinese counterparts with the intention of exploring more fully the dynamics of the U.S.-China-Russian triangle. Toward this end, the Project intends to host a delegation from the Foundation for International and Strategic Studies to discuss missile defense and crisis management, as well as more familiar topics, such as cross-Strait questions, North Korea, and military-to-military relations between the People's Republic of China and the United States. In the discussions of crisis management, the objective would be to explore how crises can best be avoided and, if not avoided, managed. In the discussions of missile defense, the objective would be to explore arms

control concepts to prevent arms racing. Finally, in support of the Nuclear Threat Initiative, Dr. Carter has been closely analyzing the multi-national arms race that seems to be looming in East and South Asia with an eye toward building a conceptual framework for threat reduction outside of the U.S.-Russian context, and especially in East Asia.

In areas beyond teaching and the Preventive Defense Project, Dr. Carter continues to serve DOD as an advisor to the Secretary of Defense and as a member of DOD's Defense Policy Board, Defense Science Board, Threat Reduction Advisory Committee, the National Missile Defense White Team, and the Board of Visitors of DOD's Regional Centers. He also sits on the board or advises several non-profit companies including: Mitre, Mitretek, Draper and Lincoln Laboratories. Additionally, Dr. Carter is a fellow at the American Academy of Arts and Sciences and a member of the Council on Foreign Relations, the American Physical Society, the National Committee on U.S.-China Relations, and the International Institute for Strategic Studies.

Richard Falkenrath is Assistant Professor of Public Policy at the Kennedy School and a BCSIA faculty affiliate. He is principal investigator of the Executive Session on Domestic Preparedness (a Department of Justice-funded joint project of BCSIA and the Taubman Center for State and Local Government). He serves as a member of the Nonproliferation Advisory Panel, Central Intelligence Agency; the Board of Visitors, National Emergency Management Institute; the Advisory Panel to Assess Domestic Response Capabilities for Terrorism Involving Weapons of Mass Destruction ("Gilmore Commission"); the International Institute for Strategic Studies; the Council on Foreign Relations; the American Council on Germany; the American Economics Association; and the Arms Control Association.

In the 1999-2000 academic year Professor Falkenrath taught the "Seminar in International Security and Political Economy" in Fall 1999 and Spring 2000, and "European Security" in Spring 2000. He also taught in the National Security Executive Programs and was an organizer of the Study Group on European Security at the Center for European Studies. On December 2-4, 1999, he and co-director Arn Howitt hosted the inaugural meeting of the Executive Session on Domestic Preparedness. This session convened for the first time its multi-disciplinary task force of leading practitioners and academics to focus on understanding and improving U.S. preparedness for domestic terrorism. Its members came together again on June 26-28, 2000, for the Executive Session's second meeting.

Sean M. Lynn-Jones is a Research Associate in BCSIA's International Security Program. He is also Editor of *International Security* and Series Editor of the BCSIA Studies in International Security book series. His research interests include American foreign policy and theories of international politics. He is a member of the Editorial Board of *Security Studies*. During 2000-2001 he served on the Governing Council of the International Security Studies Section of the International Studies Association. His articles have appeared in *Foreign Policy*, *International Security*, *Security Studies*, and other journals. He is the editor or co-editor of many books, including *Theories of War and Peace*, *The Cold War and After*, and *Debating the Democratic Peace*.

During 2000-2001, Sean devoted most of his time to overseeing the publication of four issues of *International Security*, which celebrated its twenty-fifth year of publication in 2000-2001, six

books in the BCSIA Studies in International Security series, and two *International Security* readers. He continued to work on a book, *Should America Spread Democracy? A Debate*, which he is writing with Christopher Layne of the University of Miami. He also conducted research on theories of offense and defense in international politics.

Sean helped to organize and participated in a BCSIA workshop on “Offense-Defense Theory: Retrospectives and Future Directions,” in September 2000.

In October 2000, he gave a talk, “Does Offense-Defense Theory Have a Future?” at McGill University, Montreal, Canada.

At the November 2000 Denver annual meeting of the International Security Studies Section of the International Studies Association, Sean was the discussant for a panel on “Wither Arms Control?,” chair of a panel on “NMD and ESDI: Allies and Alliances,” and chair and discussant for a panel on “Humanitarian Intervention: Constructing Global Norms?”

Stephen M. Walt. During 2000-2001, Stephen M. Walt served as the Robert and Renee Belfer Professor of International Affairs at the Kennedy School of Government, and became Faculty Chair of the International Security Program of the Belfer Center. During the fall term, he taught *Force and Statecraft* (ISP-341), a course that examines how states use military power to advance their diplomatic objectives. Specific topics include the causes of international conflict, misperception, deterrence, coercion, crisis management, war termination, the use of economic sanctions, and escalation. The course explores these topics by reading the relevant theoretical literature, examining several recent case studies, and through an detailed in-class simulation. During the spring term, Professor Walt taught *International Relations: Theory and Policy* (ISP-330). This course examines the different general theories that scholars use to analyze international politics, and shows how a more sophisticated theoretical understanding helps illuminate the choices that policymakers inevitably face. Professor Walt also taught in several executive programs, including the program for senior Chinese military officers, the program for senior Russian military officers, the Ukrainian national security program, and the Women Waging Peace program.

Professor Walt’s research combines a general interest in international relations theory with a specific focus on contemporary U.S. foreign policy. In addition to working on a book manuscript on global responses to U.S. primacy, Professor Walt also published the following articles during the past year:

“The Enduring Relevance of the Realist Tradition,” in Ira Katznelson and Helen V. Milner, eds., *Political Science: State of the Discipline III* (W.W. Norton, forthcoming)

“Keeping the World Off Balance: Self-Restraint in U.S. Foreign Policy,” forthcoming in John Ikenberry, ed., *Whither Pax Americana?:* (Cornell University Press, forthcoming);

“NATO’s Future (In Theory),” in M. Brawley and P. Martin, eds., *Allied Force or Forced Allies?: Alliance Politics, Kosovo, and NATO’s War* (New York: St. Martin’s Press, 2000)

“The U.S.-Japan-China Triangle: Will The United States Remain Engaged?” in Yuen Foong Khong, ed., *Security Challenges and Regional Responses in the Asia-Pacific in the 21st Century* (Singapore: Institute for Defence and Strategic Studies, 2000).

“Fads, Fevers, and Firestorms: Understanding Political Contagion,” *Foreign Policy*, no. 121 (November/December 2000).

Professor Walt presented some of the results of his current research at Harvard’s Weatherhead Center for International Affairs, at the Kennedy School’s Faculty Research Lunch series, and the International Security Program’s weekly brown-bag lunch series. He also presented these findings at the Carnegie Endowment for International Peace in Washington, D.C., and at the Central Intelligence Agency, and was a panelist at the Current Strategy Forum at the U.S. Naval War College in Newport, Rhode Island. He was also a participant at the annual conference of the CIA’s Strategic Assessments group in Wilmington, Delaware, and chaired the Whitney Shepardson Discussion Series at the Council on Foreign Relations in Washington, D.C.. He also made several appearances on the BBC/WGBH “The World” program, and on WBUR’s “The Connection.”

In addition to these research activities, Professor Walt also served as Co-editor of the *Cornell Studies in Security Affairs*, is on the Editorial Boards of the journals Foreign Policy, Security Studies, Journal of Cold War Studies, and Columbia International Affairs Online Service, and was a member of the Board of Directors of the *Bulletin of the Atomic Scientists*. He was also a member of the coordinating committee for the Harvard Colloquium on International Affairs, the Executive Committee of the Weatherhead Center for International Affairs, and served on several faculty search committees and the Appointments Committee of the Kennedy School.

RESEARCH FELLOWS

Samina Ahmed is a Research Fellow, Belfer Center for Science and International Affairs. She has previously worked at the Institute of Regional Studies, Islamabad and the Pakistan Institute of International Affairs, Karachi. Dr. Ahmed has a Master’s in International Relations and a Ph.D. in Political Science from the Australian National University, Canberra. She has worked as a visiting Fellow at Oxford University, a Research Researcher at the Stockholm International Peace Research Institute and as a Visiting Scholar at the Cooperative Monitoring Center, Sandia National Laboratories. Dr. Ahmed is the author of several book chapters and articles in academic journals and the print media. Her latest publications include “Pakistan: Professionalism of an Interventionist Military” in Muthiah Alagappa, ed., *Military Professionalism in Asia: Conceptual and Empirical Perspectives* (Honolulu: East-West Center, 2001); Samina Ahmed and David Cortright, *South Asia at the Nuclear Crossroads. U.S. Policy Options towards South Asia: The Role of Sanctions and Incentives*. (Managing the Atom Project, Belfer Center for Science and International Affairs, Harvard University, the Fourth Freedom Forum, and the Joan B. Kroc Institute for International Peace Research, University of Notre Dame, 2001); “Security Dilemmas of Nuclear-armed Pakistan,” *Third World Quarterly*, Vol. 21, no. 5 (October 2000); and “Pakistan’s Nuclear Weapons Program: Turning Points and Nuclear Choices,” *International Security* 23, no. 4 (Spring 1999). Ongoing research is on the internal dynamics of nuclear crisis stability in South Asia.

Ivan Arreguín-Toft is a postdoctoral fellow in the International Security Program at BCSIA. He holds a Ph.D. in Political Science from The University of Chicago, where his dissertation research received support from the Smith-Richardson Foundation and the Institute for the Study of World Peace. His current research focuses on how strong actors-states or nations-lose when they engage what appear to be much weaker adversaries. His research demonstrates that the interaction of the strategies actors employ explains conflict outcomes better than competing explanations. His work at BCSIA this year focused on completing his book manuscript “Theory of Asymmetric Conflict;” and on the completion of two related journal articles: “David vs. Goliath: strategic interaction in unexpected conflict outcomes,” and “Waging Wickedness: the futility of barbarism as a coercive strategy in war.”

Eitan Barak submitted his doctoral dissertation at Tel-Aviv University, a comparative study of international limited regimes in the Middle East. He graduated magna cum laude in Political Science and Law from Tel-Aviv University, and studied Security Studies where he earned three awards for outstanding achievement. He has received awards from the Morris E. Curiel Center for International Studies (1997), the David & Paula Ben-Gurion Fund (1998), the Chaim Herzog Center for Middle East Studies & Diplomacy (2000) and the Fulbright award for Israel Post-Doctoral Scholars (2000-01), and the Leonard David Post-Doctoral Fellowship for the year 2001-2002.

He taught B.A. and M.A. students at Tel Aviv University and was an evaluator of senior faculty, in the University’s Center for the Advancement of Teaching. Barak worked as a jurist (he is a member of the Israeli Bar) for the Ministry of Defence and as a research for the Israeli government. His recent publications include an extensive article (80 pages) in the latest *Israel Annual Journal of Criminal Justice* (plilim) and a lead article in *The International Journal of Human Rights* (Autumn 1999). His research is on the potential for eliminating chemical weapons arsenals in the Middle East through the implementation of a comprehensive arms control regime under the rubric of the Chemical Weapons Convention. Next year he will teach courses and seminars at the Faculty of Social Science, Hebrew University and the Faculty of Law, Tel-Aviv University.

Stephen Black research focuses on the history and impact of the United Nations weapons inspections in Iraq, from 1991 to 1998. The experiences of the United Nations Special Commission and the International Atomic Energy Agency Action Team cover all areas of arms control verification and will form an important building block for future weapons control and elimination regimes. Mr. Black is writing a history, based on extensive primary source research, of the efforts to eliminate Iraq’s weapons of mass destruction.

In addition to his historical project, Mr. Black completed three shorter works:

“Digging Deep: The United Nation’s Investigation of Iraq’s WMD Capabilities”
Presented to the 32nd Annual Meeting of the Northeastern Political Science Association
and International Studies Association-Northeast. (Albany NY, November 2000),

“Verification Under Duress: The Case of UNSCOM” in *Verification Yearbook 2000*, Trevor Findlay ed. (Verification Research, Training and Information Center, London, December 2000), and

“UNSCOM and the Iraqi Biological Weapons Program: Technical Success and Political Failure.” to appear in a forthcoming volume edited by Dr. Susan Wright.

Mr. Black has also served as a reference and reviewer for journalists and researchers working on matters related to the inspections in Iraq and the Iraqi WMD programs. He has recently provided assistance to Jane’s, The New York Times, The Los Angeles Times, and the Center for Nonproliferation Studies at the Monterey Institute.

Nathan Busch. His primary activities during the year were devoted to completing his Ph.D. dissertation. The dissertation focused on the current debate in security studies literature over the risks associated with the proliferation of nuclear weapons. In order to help identify these risks, he examined whether countries with nuclear weapons have adequate controls over their nuclear arsenals and fissile material stockpiles (such as highly enriched uranium and plutonium), and the reasons why countries do or do not implement these controls. The project consisted of a series of systematic analyses of the nuclear programs in the United States, Russia, China, India, and Pakistan. These case studies help identify the strengths and weaknesses of different systems of nuclear controls and what types of controls emerging nuclear powers are likely to employ. He submitted his dissertation in June 2001 and defended it August 8, 2001.

Doctoral Dissertation: *Assessing the Optimism-Pessimism Debate: Nuclear Proliferation, Nuclear Risks, and Theories of State Action*, Ph.D. Dissertation (Toronto: University of Toronto, Department of Political Science, 2001).

Gavin Cameron spent this year studying the threat of terrorism with biological weapons, directed against US agriculture. Mr. Cameron wrote a paper on the economics of the issue that my co-author presented at a UN-sponsored conference, "Countering Terrorism Through Enhanced International Cooperation", held at Courmayeur Mont Blanc, Italy, on September 22-24. This paper will be published the Fall 2001 edition of the peer-reviewed journal *Terrorism & Political Violence*. A version of the same article was published as an occasional paper by the BCSIA Executive Session on Domestic Preparedness in June 2001.

In November, Mr. Cameron was one of three organizers of a conference to discuss terrorism against agriculture. The meeting, sponsored by Lawrence Livermore National Laboratory (LLNL), involved 40 participants from the policy, scientific and academic communities, and was held at Cornell University on November 12-13. The book-length proceedings, edited by me and the two other meeting organizers, will be published by LLNL this Fall, and will appear simultaneously in electronic and hardcopy versions. In addition to the proceedings from the conference, a summary of the main findings from the meeting, co-written by the organizers, will be published in the September/October edition of *Bulletin of the Atomic Scientists*.

As well as analyzing terrorism against agriculture, Mr. Cameron continued his research interest in the US Domestic Preparedness Program, designed to protect against terrorism with mass destructive weapons. In October and May, Gavin attended meetings of the Belfer Center's Executive Session on Domestic Preparedness, held at Harvard. In February, he attended the International Studies Association annual convention in Chicago, and presented a paper comparing the preparations against catastrophic terrorism taken by the United States, United Kingdom, Canada, Japan and Israel. Gavin later presented versions of this paper for meetings at the Belfer Center and Carleton University, Canada. The article based on this paper will be published in the January/February 2002 edition of the peer-reviewed journal, *Studies in Conflict & Terrorism*.

Mr. Cameron remains interested in studying the future of terrorism, and participated in a conference on "Trajectories of Terrorist Violence", organized by Harvard's Guzman Center for European Studies on March 9-11. Mr. Cameron has used the remainder of this year to complete research for my next book, *Mendacity & Murder*, on when and why governments make concessions to terrorist demands.

Next year, Mr. Cameron will begin a faculty position in the Department of Politics and Contemporary History at the University of Salford in Manchester, England.

Laura Donohue. Since August 1999, Dr. Donohue has been engaged in research relating to terrorism, counter-terrorist law, and domestic preparedness for terrorist attack. In April of this year she completed the proofs for her first book, *Emergency Powers and Counter-Terrorist Law in the United Kingdom 1922–2000*. It was published by the Irish Academic Press in Dublin, Ireland in June 2000. She is also working on several additional paper which are to be incorporated into her next book, *Americas fight against Terrorism* which will be published within the next year.

Dr. Donohue's appointment at BCSIA is in tandem with her role on the Executive Session for Domestic Preparedness, where she is working with Prof. Richard Falkenrath and Prof. Arnold Howitt to develop the program and to engage in research that will be of help to the Session and to the Department of Justice. In addition to weekly meetings, original research, review of others' manuscripts, coordination of the Sessions, and participation in the Executive meetings, she serves in a consultative role for other members of the Executive Session. For instance, Peter Beering recently forwarded the most recent proposals for counter-terrorist legislation in Indiana. She is working with him on examining the form and content of the measures, how they are similar to or differ from other states' measures, and the impact on civil liberties.

Over the past six months she has had the opportunity to consult for the Northern Ireland Human Rights Commission. Her work for them has centered on both recommendations for permanent counter-terrorist legislation in the United Kingdom, as well as a strategy for the initial, consultative, draft, and consolidation phases of the Bill of Rights. She has been invited to return to Belfast in the coming year and expect to continue in a consultative capacity for the NIHRC.

This past year Laura Donohue with Ariel Merari co-founded the *Terrorist Roundtable*, a symposium that meets monthly to discuss terrorist issues. They realized that there are a number of academics at Harvard that are engaged in terrorist research; however, owing to the great diversity and decentralization of the University, there was no existing forum in which these academics could meet routinely to discuss their research. Those active on the Roundtable range from the Kennedy School and the Law School, to the Government Department and the Department of Molecular Biology. Donohue has found in the Roundtable an opportunity to pursue ideas during their formative stages and to expose them to others who study and think about similar issues. Two or more members routinely get together on a weekly basis to circulate papers and share information.

David Edelstein. During the 2000-2001 year, David Edelstein continued his research on how governments attempt to discern the intentions of other countries. More specifically, his research focuses on how states balance concerns about other states' material capabilities with assessments of their likely intentions. The argument is evaluated by examining how governments have historically assessed the intentions of rising great powers in the international system. Finally, the analysis is applied to contemporary international politics with particular focus on how the U.S. government is currently attempting to gauge Chinese intentions. In the past year, Edelstein presented his research at the annual meetings of the American Political Science Association and the International Studies Association. In addition, he was an invited speaker at the Canadian Forces College in Toronto where he lectured on the nature of coalition warfare.

Evan Feigenbaum. During 2000-01, Dr. Feigenbaum worked to develop a new Asia-Pacific security program for the Kennedy School, based in BCSIA and building on the School's existing foundation of China-related security dialogues. Together with senior School officials, he worked on a capitalization campaign for an initial budget covering existing programs, start-up costs, and new projects, and sought to develop new dialogue and training programs for the School with the countries of the Asia-Pacific.

Feigenbaum served as Program Chair of the Kennedy School's 2000 Program for Chinese Senior Defense Scholars, as well as its 2000 Executive Program for Senior Chinese Military Officers. He participated in the School's 2000 US Senior Defense Experts Program in China, which visited Chinese infantry, naval, and academic institutions in Beijing, Chongqing, Guangzhou, and Guilin. He also served as rapporteur of two Kennedy School conferences in China on "The Use of Military Force in the Current Era," one with the PLA Academy of Military Sciences, the other with the Chinese People's Institute of Foreign Affairs.

Feigenbaum published articles on US-China relations, Chinese foreign policy, and the East Asian strategic balance in *The Washington Quarterly*, *Far Eastern Economic Review*, and *International Herald-Tribune*, and finalized his book *China's Techno-Warriors: National Security and Strategic Competition from the Nuclear to the Information Age*, forthcoming in 2002 from Stanford University Press. He has additional articles forthcoming in the *Journal of American-East Asian Relations*, and in an edited volume on the China-Japan-US triangle from the Brookings Institution Press and Japan Center for International Exchange.

Feigenbaum appeared extensively in both broadcast and print media during the US-China EP-3 reconnaissance plane incident in March 2001, as well as after the announcement of the April 2001 US arms sales package to Taiwan. He participated in the 2000 Australian-American Leadership Dialogue in Washington, as well as in the first session of a National Intelligence Council-RAND study group on Chinese foreign policy.

His ongoing projects include a study of the management of safety in China's nuclear power industry, for which he conducted extensive interviews with Chinese nuclear regulatory personnel in Beijing in August 2000, as well as various projects on China's national security policy and its strategic interaction with the major powers of East Asia.

John Garofano is Senior Fellow with the International Security Program of the Belfer Center for Science and International Affairs. He is currently completing a study of U.S. decisions on the use of force from 1950 to the present, with a focus on how civil-military relations shaped those decisions and the strategy that resulted from them. Forthcoming articles related to this general topic include: a study of intervention doctrines in American foreign policy; a study of U.S. peace operations in Bosnia; and a review of recent literature on the Vietnam war. Recent letters and book reviews have appeared in *The National Interest*, *Wilson Quarterly*, *Parameters*, and a presidential transition team briefing book. His other area of research and publication is Asian security. Works under review involve the potential for the emergence of a security community in the region, and the potential for a CFE-type agreement on arms control. This year he gave lectures on various of these topics at the RAND Corporation, Ohio State University, Cornell University, and the Defense Threat Reduction Agency. In July his article, "Deciding on Military Intervention: What is the Role of Military Leaders?" won the Nott Prize for exceptional article published in the *Naval War College Review* for the publishing year. Dr. Garofano received the Ph.D. from Cornell University.

Peter Grose returns as a research fellow in the International Security Program, fresh on publication of his book "Operation Rollback: America's Secret War Behind the Iron Curtain" (Houghton Mifflin 2000). He made numerous radio and personal appearances around the country - NPR, Council on Foreign Relations, etc. - to discuss the book, and is eager to plunge back in now at BCSIA with a welcome change of pace.

For the coming year, Peter will be switching from examining the intelligence community to a novel look at a private sector player in American foreign policy. He has been given unprecedented access to the archives of a large international insurance and financial services company, with a view to determining how a meaningful history of the company can be juxtaposed with US international relations during the 20th century and into the 21st.

Peter was Executive Editor of Foreign Affairs before coming to Harvard and continues as a consulting editor of the journal. Previously he was a foreign and diplomatic correspondent for The New York Times, and a member of The Times' editorial board. He served as deputy director of the State Department Policy Planning Staff early in the Carter administration, under Secretary of State Cyrus Vance.

Erin Jenne Erin Jenne received her Ph.D. in Political Science from Stanford University in August 2000. Her dissertation, "Group Demands as Bargaining Positions: Signals, Cues and Minority Mobilization in East Central Europe," develops a general theory of group demands and minority mobilization. Jenne tests this theory using archival and interview data on six cases of ethnic mobilization collected during a 14-month research trip in 1997-98 to Slovakia, the Czech Republic and Romania with the support of an Institute for the Study of World Politics grant. In 1999-2000, she was a MacArthur Fellow at the Center for International Security and Cooperation (CISAC) at Stanford University and is currently in residence as a Belfer Center Post-Doctoral Fellow in the International Security Program at Harvard University, where she has contributed to two edited volumes on state failure and ethnic interventions and is currently revising her dissertation for book publication. She received several fellowships during her graduate studies and speaks and reads Czech and German. Before entering graduate school, she worked briefly as the public relations manager for the North Bohemia Economic Association, a non-profit organization assisting in the privatization process in the Czech Republic. Her dissertation recently received the 2001 Lipset Award for the Best Comparativist Dissertation of the Year.

Erin K. Jenne, "The Roma of Central and Eastern Europe: Constructing a Stateless Nation," in Jonathan Stein (ed.) *The Politics of National Minority Participation in Post-Communist Europe: State-building, Democracy, and Ethnic Mobilization* (M.E. Sharpe: Armonck, NY), 2000.

Sergei Konoplyov is Director of the Ukrainian National Security Program at the Kennedy School as well as a fellow with the International Security Program. He has recently completed a survey of analytical centers of Ukraine that is currently being published in the BCSIA discussion paper series. He is also working on an annual publication *Ukrainian National Security* with the Ukrainian Center for Economic and Political Studies due to be published in July 2000. Additionally, he is writing a chapter "Ukraine, GUUAM, CIS and Western Policy" for a book on Ukrainian Foreign Policy due to be published later this year.

Alan Kuperman is a Ph.D. candidate in Political Science at MIT. His current research focuses on the causes of violent ethnic conflict and genocide, and the feasibility of effective humanitarian military intervention. He has published articles in *Foreign Affairs*, *Political Science Quarterly*, *SAIS Review*, the *Washington Post*, the *Wall Street Journal*, the *Los Angeles Times*, and other journals and newspapers. He has regional expertise in the Balkans, the Great Lakes region of Africa (especially Rwanda) and Iraq. Prior to attending MIT, he worked in Washington, D.C. including as legislative director to then-Congressman Charles Schumer and as legislative assistant to then-Speaker of the House Tom Foley. He also served as a fellow at the U.S. Agency for International Development, monitoring Haiti's post-intervention nation-building activities. He also has worked for a Washington-based non-profit organization, the Nuclear Control Institute. On issues of nuclear non-proliferation. Kuperman has previously been awarded academic fellowships by the U.S. Institute of Peace, the Harvard-MIT MacArthur Transnational Security Program, the Brookings Institution, and the Institute for the Study of World Politics. He holds a Master's degree in International Relations and International Economics from the School of Advanced International Studies (SAIS) of Johns Hopkins University, and a Bachelor's degree from Harvard University.

Jens Meierhenrich is a Lecturer on Social Studies, Harvard University, and a Postdoctoral Fellow in the International Security Program at the Belfer Center for Science and International Affairs, John F. Kennedy School of Government. He is also a Research Associate at Harvard's Project on Justice in Times of Transition, where he is co-directing a multi-year study on comparative prosecution. A former Rhodes Scholar, he completed his D.Phil. in Politics and International Relations at the University of Oxford. He specializes in comparative politics, international relations, and law. His current research is on collapsed states, truth and justice in international politics, democracy and prosecution, comparative corruption, and the democratic peace. Dr. Meierhenrich is completing a book manuscript, *Usable States*, and has also begun work on *State Formation and State Collapse*, a comparative study of state collapse in international politics. He is the author of *Justice in International Politics*, a forthcoming Adelphi Paper, and the co-editor of *Democratization and Foreign Policy*. Dr. Meierhenrich taught previously in Harvard's Department of Government and at the University of the Witwatersrand, Johannesburg.

Brenda Shaffer served as a post-doctoral fellow at the International Security Program at the Belfer Center for Science and International Affairs at Harvard's Kennedy School of Government. In the spring, Brenda was appointed concurrently a fellow at Harvard's Caspian Studies Program. Dr. Shaffer's main research interests include political, social and security trends in the Caucasus and Central Asia, with emphasis on the Republic of Azerbaijan; the Azerbaijani minority in Iran; Ethnic politics in Iran; Russian-Iranian relations; Iranian policy in Central Asia and the Caucasus; and the Karabagh Conflict. Brenda is also interested in the impact of newly established ethnic-based states on co-ethnics beyond the states' borders, as well as the effect of political borders dividing between co-ethnics on collective identity. She received her Ph.D. from Tel-Aviv University for her work on "The Formation of Azerbaijani Collective Identity: in Light of the Islamic Revolution in Iran and the Soviet Breakup." This dissertation examines the Azerbaijanis in both Iran and the Republic of Azerbaijan and the connections and mutual influences between them. Dr. Shaffer has worked for a number of years as a researcher and policy analyst for the Government of Israel, and reads number of languages, including Turkish, Russian, Azerbaijani, Hebrew and Uzbek. Brenda has taught courses in the Political Science Department of Hebrew University of Jerusalem, and has served in the Israel Defense Forces.

The major focus of Dr. Shaffer's research while at the Belfer Center this year is a book: *Russian-Iranian Relations and Cooperation*, which will be published this year by the Washington Institute for Near East Policy. In July 2000, Dr. Shaffer was appointed Research Director at Harvard's Caspian Studies Program.

Peter Singer. Peter W. Singer is a Doctoral Fellow in the International Security Program. Currently a Ph.D.candidate in the Department of Government at Harvard University, his research is on the rise of privatized military firms and changes in international relations after the Cold War. Other research interests include changes in modern warfare, peacekeeping operations, internal conflict and failed states, Africa, and the Balkans. He previously attended the Woodrow Wilson School of Public and International Affairs at Princeton University and has worked with

Duke University, the International Peace Academy, and the US Department of Defense, Balkans Task Force.

- Conducted research and writing on central project exploring the privatization of military services, focusing on current and past firm activities and their historic corollaries.
- Conducted research and writing on the rise of child soldiers in contemporary warfare.
- Presented current findings at ISP Seminar: “Caution: Children at War.”
- Co-organizer of the annual Harvard Colloquium on International Affairs, a joint Kennedy School-Law School-Weatherhead Center conference.
- Coordinated Belfer Center sponsored panels on “US National Missile Defense” and “US Grand Strategy”

James Walsh. The primary objective of Walsh’s research is to understand how and why countries make choices about nuclear weapons, and in particular, why relatively few states - far fewer than predicted - have acquired nuclear weapons. Indeed, the restraint of nuclear proliferation is certainly one of the unheralded policy successes of the 20th century. Understanding the factors that influence nuclear choices will allow governments and members of the international community to design more effective policy tools for preventing the proliferation of nuclear and other weapons of mass destruction. The results of the research suggest that nuclear choices are influenced as much by politics and institutions as they are by external threats and technology. The research generated several products, including, two conference papers, a talk, and a book manuscript. The paper “State Motivations and Weapons of Mass Destruction: An Alternative Approach” was delivered at the conference “Influencing the Motivations of WMD States.” The conference was sponsored by the DCIA’s Center for Nonproliferation and the Naval Postgraduate School. Another paper, “Crises and Nuclear Learning: The Construction and Institutionalization of “Lessons Learned,” was delivered at Stanford University’s Workshop on Interpretations of Nuclear Crisis.” The talk, “Bombs Unbuilt: Power Ideas, and Institutions in International Politics” was given at the University of California, Berkeley’s International Relations Colloquium, Yale University, and Harvard University. The book manuscript, which is based on his dissertation, has drawn the interest of two university presses which have invited him to submit it for review.

For the BCSIA’s “Loose Nukes” group, Walsh’s efforts this year have focused on a new paper, “Atoms on the Sly: the History of Nuclear Smuggling and Clandestine Procurement.” The paper examines contemporary concerns about nuclear smuggling in a broader historical context and finds that clandestine and “non-traditional” attempts to acquire nuclear weapons have been a regular feature of the nuclear age. The findings suggest both that nuclear smuggling is a real danger and that it can be affected by policy making. He also worked with Matt Bunn and John Holdren to organize the periodic meetings of the Loose Nukes working group.

Walsh gave two talks on the issue of arms control at Harvard: “The Status of Nuclear Arms Control: A Scorecard,” at the Japan-US Nonproliferation Workshop and a talk on the Comprehensive Test Ban Treaty for an undergraduate lecture series. In addition, he discussed the CTBT on the public radio program, the *Connection*, which is syndicated in thirty-five cities.

There are just under 7,000 English-language catalogued books and papers on the subject of nuclear weapons, but there is not a single book documenting Iranian nuclear policy. This year, with the support of a BCSIA summer intern, Walsh began a new research project on Iranian nuclear decision making. This year's efforts focused on three areas: 1) conducting a survey of the relevant secondary source material, 2) identifying the community of specialists who share an interest in Iranian nuclear policy, and, 3) securing resources to cover the costs of archival and international field research. In addition, he participated in the Nixon Center's "Workshop on Iran's Nuclear Weapons Options," which brought together Iran experts, NSC staff, and nonproliferation specialists to discuss contemporary issues in Iranian policy.

For MTA's conference on openness, Walsh wrote a draft paper entitled "The Information Advantage: the Nonproliferation Costs and Benefits of Declassification." The paper suggests that sensible but robust declassification of US archival documents will strengthen, not weaken, its ability to promote nonproliferation.

ASSOCIATES

Clark Abt. In the past year, Dr. Clark C. Abt was involved in two research projects:

- Completion of his book-length manuscript, *Solar-Powered Economic Growth*, including case studies of cost-competitive and environmentally benign photovoltaic electricity supply in rural and urban Africa, Brazil, China, Europe, and the U.S.
- Initiation and supervision of a design study and financially competitive development process for the first solar-powered and solar-heated/cooled high rise office building construction in New England - and possibly the U.S. - in Cambridge, at a construction cost no greater than that of a conventional office building of similar size (50,000 square feet - 200 offices) and shape, intended for 2002 occupancy.

Charles Cogan. During the past year, Cogan embarked on a book project for which he is under contract with Praeger to complete by the end of the year 2001. The book, which will deal with the France-NATO relationship since the end of the Cold War, will be published under the auspices of Boston University's International History Institute in its International Relations series. In this connection, he has presented papers at three conferences which will form the basis of chapters in the book. These were in Seattle (May 2000) on the Euro-American Security Dilemma, 1994-2000; in Paris (June 2000) on the American attitude toward the European Security and Defense Identity; and in Oslo (August 2000) on "NATO and the EU: the Contest for Enlargement."

In addition, Cogan presented a paper at a conference of the Cold War International History Project in Hong Kong in January 2000. It is entitled, "Towards a Colonial War: the American Takeover of Responsibility in Vietnam, 1945-1956."

Owen R. Coté, Jr. In his capacity as the Associate Director of MIT's Security Studies Program, Coté continued his research and writing on the sources of innovation in military doctrine. In December 1999, he organized a conference on the technical and doctrinal shortcomings and opportunities in the U.S. military's approach to attacking mobile targets, as illustrated for

example in operations during Allied Force against Serbian military and para-military forces in Kosovo. The report of the conference, entitled *Mobile Targets From Under The Sea*, has been widely cited and has informed research and development activity in this mission area in both the Navy and the Defense Advanced Research Projects Agency. It is available at the MIT/SSP website <http://web.mit.edu/ssp/>. Also, under the sponsorship of the Navy and the Johns Hopkins Applied Physics Laboratory, he completed a historical study of the U.S. Navy's Cold War antisubmarine warfare effort in April of 2000. He also wrote a chapter in *Holding the Line: U.S. Defense Alternatives for the 21st Century*, forthcoming from MIT Press in the BCSIA book series in January 2001. Finally, he continues to serve as an Editor of the Center's prestigious journal *International Security*.

Helen Fein. During the past year, Fein continued research and writing on *Wresting Human Rights/Arresting Human Wrongs*, a book integrating an explanation of gross violations of human rights in the 20th century with social theory and history. She is presenting a paper based on this before the conference of the American Sociological Association in August: "No Brave New World: Life Integrity Rights and Freedom in the World, 1997 and 1987" (also under journal review).

Philip Fellman, consulted on counter-terrorism and related security issues for the Ministry of Internal Affairs, United Arab Emirates and the Dubai Police Force. He published a brief article in "Emergence: A Journal of Complexity Studies", was invited to a seminar at the Joint Intelligence School, and generally answered intelligence related queries, primarily academically related as able. Fellman brought several doctoral students from New Hampshire to see BCSIA symposia and presentations and was particularly pleased to attend the symposium on the Carnegie Foundation Study on Limiting of Deadly Conflict.

Lisbeth Gronlund's primary activity for the year has been analyzing the planned US national missile defense system. She was a primary author of a technical analysis of potential countermeasures to the planned system that could be deployed by emerging missile states.

Ambassador Robert E. Hunter continued his research, writing, and lecturing in international affairs, specializing in Europe (NATO, the European Union, European Security and Defense Policy), globalization, the Middle East, and major developments in U.S. foreign policy and defense, including relations with Russia. He also took part in task forces on the Middle East, Germany, global security policy, and State Department reform. He co-chaired RAND's bipartisan project on *Transition 2001*, and was co-author of its report, *Taking Charge* (<http://www.rand.org>). He lectured extensively in the U.S. and Europe and engaged in research in several countries in Western Europe, Central Europe, and Russia.

Publications included:

"Presidential Leadership: Bill Clinton and 'NATO Enlargement,'" in *Triumphs and Tragedies of the Modern Presidency*, Washington, D.C.: Center for the Study of the Presidency, 2000.

"Coalitions and Burden Sharing," in *In Harm's Way: Intervention and Prevention*, Washington, D.C.: Center for the Study of the Presidency, Fall 2000.

“NATO Enlargement: Decisions for the New President,” in *Taking Charge: Discussion Papers*, Washington, D.C.: RAND, 2000.

“Globalisation, the US, Geopolitics and New Partnerships in the 21st Century,” in *The Sydney Papers*, Vol. 12, No.3, Winter 2000.

“America, Britain, Europe: the New Security (The Next 50 Years —What Would Bevin Do?),” 2001 Ernest Bevin Memorial Lecture, published by The Atlantic Council of the United Kingdom and the Trades Union Committee for European and Transatlantic Understanding, February 2001.

“Global Economics and Unsteady Regional Geopolitics,” in *The Global Century: Globalization and National Security*, in Richard L. Kugler and Ellen L. Frost (eds.), Washington, D.C.: National Defense University Press, 2001.

“The Transatlantic Security War?” in Daniel N. Nelson (ed.), *Brassey’s Eurasian and East European Security Yearbook*, Washington, D.C.: Brassey’s, 2001.

“America and Europe: Strategic Dialogue 2001, in *Jahrbuch fur internationale Sicherheitspolitik 2001*, Erich Reiter (ed.), Hamburg, Berlin, Bonn: Verlag E.S. Mittler & Sohn GmbH, 2001.

Also, frequent “op-ed” articles in the *Los Angeles Times*, as well as in *Defense News* and *The Washington Times*.

At the February 2001 annual convention of the International Studies Association in Chicago, Sean was a discussant for panels on “Regenerating Realism” and “New Directions in Offense-Defense Research.”

Marcel J. Lettre II. Lettre's activities and research this year focused on globalization and national security in three dimensions. First, Lettre conducted research on White House coordination of international economic and national security policy, with a focus on policy implications of different organizational approaches to policy and program coordination, including a joint staff shared between the National Security Council and the National Economic Council. Second, Lettre was a contributor on the Defense Organization and Management (DOAM) task force, a research assistant and co-author on the team's final report, and active in outreach after the release of the report. Third, Lettre co-founded the Council for Emerging National Security Affairs, and directed a team of 27 authors on its presidential transition memorandum project recommending actions on international security issues of concern over the next five to twenty years. The report involved all the junior members of the DOAM team, and was delivered to the presidential transition team and to more than 700 hundred members of the policy community.

Publications (July 2000-June 2001):

- Marcel Lettre and James Anderson, eds., *Passing the Torch: Recommendations to the Next President on Emerging National Security Issues*, (Cambridge, MA: Council for Emerging National Security Affairs, 2000).
- Ashton B. Carter with Marcel Lettre and Shane Smith, “Chapter 6: Keeping the Technological Edge,” in Ashton B. Carter and John P. White, eds., *Keeping the Edge: Managing Defense for the Future*, (Cambridge, MA: Harvard-Stanford Preventive Defense Project, 2000 and MIT Press, 2001).
- Marcel Lettre, *Coordinating National Security Policy and International Economic Policy at the White House: The NSC-NEC Joint Staff Mechanism*, White Paper to the Presidential Transition Team (Cambridge, MA: September 2000)

George N. Lewis is an Associate Director of the MIT Security Studies Program. Trained as a physicist, his current research is on ballistic missile defenses and nuclear arms reductions. During the past year, he focused on the technical feasibility and strategic implications of the impending U.S. decision on deployment of a National Missile Defense (NMD) system. He participated in the joint Union of Concerned Scientists/Security Studies Program study on the operational effectiveness of the planned NMD system, the report of which, “Countermeasures,” was released in April. He also published several other papers on these subjects during the last year and gave talks or participated in meetings at Cornell University and the University of Michigan, and in Beijing, Berlin, Boston, New York, Ottawa, Shanghai, and Washington D.C.

Michael Lippitz. His research this year focused on the implications of the DOD “Revolution in Business Affairs” for industrial base management. He developed and began to articulate a concept called “value based acquisition, ” a novel contracting approach that permits market mechanisms to be applied to the development stage of complex defense system. Application of market mechanisms allows contractors to profit from finding innovative solutions to defense needs. Associated with this, he has been examining the more general problem of the role DoD can play in the encouraging the development of breakthrough technologies, given tectonic shifts that have occurred in the defense and commercial industrial bases during the past few decades.

Publications:

Michael J. Lippitz, Sean O’Keefe and John P. White, “Advancing the Revolution in Business Affairs” in Ashton Carter & John White, Ed., *Keeping the Edge: Managing Defense for the Future*, (MIT Press, Cambridge, MA, October 2000), pp. 165-202.

Martin Malin is Program Director of the Committee on International Security Studies (CISS) at the American Academy of Arts and Sciences, in Cambridge Massachusetts. His research has concerned great power relations with the Middle East and the sources of conflict in that region. He has taught courses on international relations, the causes of war, American foreign policy, and Middle Eastern politics at Columbia and Rutgers Universities. He has also worked as a consultant at the Social Science Research Council, with the SSRC-MacArthur Program on International Peace and Security. He recently published “Chickens, Eggs, and the End of Violence in Israel and Palestine,” in *Conflict Resolution Journal* (Spring 2000). Malin received a

Master of International Affairs from Columbia University's School of International and Public Affairs and his Ph.D. in political science from Columbia University.

Andrew Parasiliti is Deputy Director of the Middle East Initiative at the John F. Kennedy School of Government, Harvard University. His responsibilities include the management, development, and administration of the Initiative's Executive Programs, including those dealing with Saudi Arabia, Israel, and the Palestinian Authority.

Dr. Parasiliti is also a specialist on Iraq and Gulf security issues. From 1996-2000, he was Director of Programs at the Middle East Institute in Washington, DC, where he directed the Institute's programs and research projects dealing with Gulf energy security, Iraq and Iran. He has conducted field research and interviews in Iraq, Iran, Israel, Syria, and Jordan, and has traveled extensively throughout the Middle East. He has appeared on *John McLaughlin: One on One, Q & A with Riz Khan*, CNN, the BBC, CBS-TV, National Public Radio, and other TV and radio news programs to discuss developments in Iraq and US-Iraq relations.

Dr. Parasiliti received a Ph.D. from the Paul H. Nitze School of Advanced International Studies, Johns Hopkins University. He is proficient in Arabic and French. He has participated in study groups and research projects on Gulf security organized by the Council on Foreign Relations, the U.S. Institute of Peace, the Washington Institute for Near East Policy, and the Center for Strategic and International Studies.

Barry R. Posen Barry R. Posen is Professor of Political Science at the Massachusetts Institute of Technology and a member of the Executive Committee of Seminar XXI, an educational program for senior military officers, government officials and business executives in the national security policy community. He has written two books, *Inadvertent Escalation: Conventional War and Nuclear Risks* and *The Sources of Military Doctrine*. The latter won two awards: the American Political Science Association's Woodrow Wilson Foundation Book Award, and Ohio State University's Edward S. Furniss Jr. Book Award. Prior to coming to MIT, he taught at Princeton University, and has also been Guest Scholar at the Brookings Institution; Post-Doctoral Fellow at the Center for International Affairs at Harvard; Council on Foreign Relations International Affairs Fellow; Rockefeller Foundation International Affairs Fellow and Guest Scholar at the Center for Strategic and International Studies; and Woodrow Wilson Center Fellow, Smithsonian Institution. Dr. Posen's current research interests are innovation in the U.S. Army, 1970-1980, and external military intervention in civil wars.

Elizabeth Rogers' interests lie in the area of economic sanctions and US foreign policy. In particular, she is interested in asset freezing and other carefully targeted sanctions.

Stephen Van Evera is preparing a book on misperception and the causes of war. He published *Causes of War: Power and the Roots of Conflict* (Cornell University Press) in 1999 and *Guide to Methods for Students of Political Science* (Cornell University Press) in 1997.

David Wright's primary work over the past year has been on two issues. The first has been on the planned U.S. national missile defense system. He helped organize and co-authored a technical report analyzing the vulnerabilities of the proposed system to countermeasures that an

attacker could deploy using technology that is simpler than the technology required to build a long-range missile and warhead. The second issue has been engaging Chinese scientists on a range of issues to improve understanding on arms control and security issues. In particular, Wright helped organize a joint U.S.-Chinese project looking at transparency and confidence-building measures that could improve relations between the two countries.

PUBLICATIONS

To review publications of the International Security Program and its members, see page 224.

EVENTS

To review events of the International Security Program and its members, see page 205.

Science, Technology, and Public Policy Program

MEMBERS

CORE FACULTY AND STAFF

John P. Holdren, Program Director and Faculty Chair;
Teresa and John Heinz Professor of Environmental Policy
Matthew Bunn, Program Assistant Director
Deborah Hurley, Information Infrastructure Project Director
Calestous Juma, Senior Research Associate; Director, Science, Technology and Innovation Project
Vicki Norberg-Bohm, Energy Technology Innovation Project Director
Nora O'Neil, Information Infrastructure Project Coordinator
Ambuj Sagar, Research Associate, Energy Technology Innovation Project
Peter Sedlak, Assistant to Professor Sheila Jasanoff, and Vicki Norberg-Bohm
Jennifer Weeks, Managing the Atom Project Director
Laura Wilson, Program Assistant and Assistant to John Holdren

Lewis M. Branscomb, Director Emeritus; Aetna Professor of Public Policy
and Corporate Management, Emeritus
Harvey Brooks, Director Emeritus; Benjamin Pierce Professor of Technology and Public Policy, Emeritus
Jean Camp, Assistant Professor of Public Policy
Ashton B. Carter, Ford Foundation Professor of Science and International Affairs
William Clark, Harvey Brooks Professor of International Science, Public Policy, and Human Development
Paul Doty, Director Emeritus, BCSIA, Mallinckrodt Professor of Biochemistry, Emeritus
Jane Fountain, Associate Professor of Public Policy
Jeffrey Frankel, James W. Harpel Professor of Capital Formation and Growth
David M. Hart, Associate Professor of Public Policy
William Hogan, Lucius N. Littauer Professor of Public Policy and Administration
Sheila Jasanoff, Professor of Science and Policy; Director, Legal, Political, and Cultural Studies of Science and
Technology
Henry Lee, Lecturer in Public Policy, Director, Environment and Natural Resources Program
Viktor Mayer-Schönberger, Assistant Professor of Public Policy
Steven E. Miller, Lecturer in Public Policy, Director, International Security Program
F. Michael Scherer, Roy E. Larsen Professor of Public Policy and Management, Emeritus
Philip Sharp, Director Emeritus, Institute of Politics
Dorothy S. Zinberg, Lecturer in Public Policy

Dean Berlin, Information Infrastructure Project Research Assistant
Bonnie Burns, Information Infrastructure Project Staff Assistant and Assistant to Professors Lewis Branscomb
and Harvey Brooks
Stephen Feinson, Project Manager, Jeffersonian Science Project
Alexander Fox, Managing the Atom Project Research Assistant
Brian Torpy, Assistant to the Managing the Atom Project, and Calestous Juma

ASSOCIATES AND VISITORS

Adolfo Chiri, Associate, STPP
Richard de Neufville, Visiting Scholar, STPP, BCSIA

Steve Fetter, Senior Research Associate, Managing the Atom Project
Robert Frosch, Senior Research Associate, STPP
Mary Graham, Associate, Harvard Information Infrastructure Project
Stephen Hilgartner, Associate, Legal, Political, and Cultural Studies of Science and Technology
Robert Hagendijk, Associate, Legal, Political, and Cultural Studies of Science and Technology
Megan Jones, Associate, Jeffersonian Science Project
Lee Litman, Visiting Scholar, STPP
Allison Macfarlane, Associate, Managing the Atom Project
Edwin Ruh, Jr., Associate, Harvard Information Infrastructure Project
Larry Scheinman, Senior Research Associate, Managing the Atom Project
Allen Sessoms, Visiting Scholar, Science, Technology and Public Policy Program

RESEARCH FELLOWS

Samina Ahmed, Post-Doctoral Fellow, Managing the Atom Project
Peng Hwa Ang, Fellow, Harvard Information Infrastructure Project
Philip Auerswald, Post-Doctoral Fellow, Managing Technical Risk Project
Colin Bennett, Fellow, Harvard Information Infrastructure Project
Nolan Bowie, Fellow, Harvard Information Infrastructure Project
Robert Doubleday, Doctoral Fellow, Legal, Political, and Cultural Studies of Science and Technology
Darryl Farber, Post-Doctoral Fellow, Managing the Atom Project
Adinarayantampi Gopalakrishnan, Senior Fellow, Managing the Atom Project/ Energy Technology Innovation Project
Xu Jing, Visiting Scholar, Energy Technology Innovation Project
Ariane Koenig, Fellow, Science, Technology and Innovation Project
Victor Konde, Fellow, Science, Technology and Innovation Project
Robert Margolis, Pre-Doctoral Fellow, Energy Technology Innovation Project
Christopher Marsden, Fellow, Harvard Information Infrastructure Project
Shigekazu Matsuura, Fellow, Managing the Atom Project
James Moor, Fellow, Harvard Information Infrastructure Project
Dianne Northfield, Fellow, Harvard Information Infrastructure Project
Shobita Parthasarathy, Pre-Doctoral Fellow, Legal, Political, and Cultural Studies of Science and Technology
Fabrizio Perretti, Fellow, Harvard Information Infrastructure Project
Jennifer Reardon, Pre-Doctoral Fellow, Legal, Political, and Cultural Studies of Science and Technology
Mary Rundle, Fellow, Harvard Information Infrastructure Project
James Short, Fellow, Harvard Information Infrastructure Project
Mariachiara Tallacchini, Fellow, Legal, Political, and Cultural Studies of Science and Technology
Robert Triendl, Fellow, Legal, Political, and Cultural Studies of Science and Technology
James Walsh, Post-Doctoral Fellow, Managing the Atom Project
Theodora Welch, Fellow, Harvard Information Infrastructure Project
Charles Wiecha, Fellow, Harvard Information Infrastructure Project
Hui Zhang, Post-Doctoral Fellow, Managing the Atom Project
Jimin Zhao, Post-Doctoral Fellow, Energy Technology Innovation Project

BACKGROUND

The Science, Technology, and Public Policy Program (STPP) focuses on the interactions of science and technology with public policy institutions and decision making. Specifically, STPP seeks to address the following three questions: First, how do these interactions work? Second,

how do they affect the mix of societal benefits, costs, and risks associated with science and technology? Third, how can the interactions be improved in ways that would increase the benefits and reduce the costs and risks?

Like the other research programs at the Belfer Center, STPP is strongly interdisciplinary, drawing on perspectives and methods from the natural sciences, engineering, political science, economics, management, and law to study problems where science, technology, and policy intersect. Current focuses of STPP research, policy outreach, and teaching include: the future of civilian and military nuclear activities and public participation in decision making about them; energy research, development, demonstration, and deployment to meet the challenge of human-induced climatic disruption; the expanding global information infrastructure; science and technology policy to promote the innovation needed for competitiveness, sustainability, and security; the processes by which science and technology policy decisions are made; and the impact of science and technology on society as a whole, along with the role of democratic governance in shaping that impact.

The 2000–2001 academic year was a time of continued policy impact and international recognition for the STPP program. In February, 2001, STPP Director John P. Holdren was awarded the prestigious Heinz Award for Public Policy, with its \$250,000 honorarium, for his decades of work on issues related to energy, environment, and the control of nuclear arms. The National Science Board awarded Professor Lewis Branscomb, STPP director emeritus, the Vannevar Bush Award – the Board’s highest award for contributions to public policy in science and technology – in May, 2001. The other recipient at the same ceremony was Harold Varmus, former director of the National Institutes of Health and Nobel Laureate.

It was also a year of substantial change and uncertainty in U.S. and international science and technology policies. In areas of particular focus for STPP, the new Bush administration abandoned previous approaches to climate change policy, including the Kyoto Protocol, and proposed to gut the budgets for energy R&D; at the same time, the new administration expressed its determination to “move beyond” the Antiballistic Missile Treaty and rejected the Comprehensive Test Ban Treaty, calling a wide range of arms reduction and nonproliferation efforts into question; international controversy over the applications of biotechnology raged, while biotechnology products surged into the marketplace; the information infrastructure continued to feel the effects of the dot-com shakeout, and the questions posed by the digital divide between rich and poor rose ever higher on the international agenda; and the Bush administration proposed substantial cutbacks in some of the approaches to government-industry partnership to promote technological innovation that had received generous support during the Clinton years. While making controversial science and technology decisions on issues ranging from arsenic in drinking water to missile defense testing, President Bush did not even name a science advisor until June, 2001, potentially setting a new record for delay in getting an effective mechanism for science and technology advice in place. Throughout these developments, STPP participants continued to play key roles, providing in-depth research and analysis, suggesting new approaches, and critiquing policy missteps.

RESEARCH AGENDA AND POLICY OUTREACH

STPP's research and policy outreach agenda for the 2000-2001 academic year included the following focus areas:

- I. HARVARD INFORMATION INFRASTRUCTURE PROJECT**
- II. ENERGY TECHNOLOGY AND INNOVATION PROJECT**
- III. MANAGING THE ATOM PROJECT**
- IV. SCIENCE AND TECHNOLOGY POLICY FOR COMPETITIVENESS, SUSTAINABILITY, AND SECURITY**
- V. SCIENCE AND TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT**
- VI. SCIENCE AND TECHNOLOGY POLICY PROCESSES**
- VII. LEGAL, POLITICAL, AND CULTURAL STUDIES OF SCIENCE AND TECHNOLOGY**

In addition to this research, STPP maintained a core focus on teaching, training the next generation of S&T policy researchers. These program areas are described in detail below.

I. HARVARD INFORMATION INFRASTRUCTURE PROJECT

CONTINUED COMMITMENT TO TEACHING

During 2000-2001, the graduate-level course offerings related to information technology policy at the Kennedy School included: HIIP Fellow Nolan Bowie, "Information and Media Regulation and Public Policy"; HIIP Director Deborah Hurley, "Information and Autonomy: Relationship Between Individual and Government in the Digital Age"; and Assistant Professor Viktor Mayer-Schönberger, "The Internet: Business, Law and Strategy." Other graduate-level courses taught by HIIP Affiliated Faculty included: Associate Professor Jane Fountain, "Doctoral Seminar in Public Management" and "Organizational and Institutional Analysis," and Assistant Professor Viktor Mayer-Schönberger, "The European Union: Political and Economic Aspects."

In addition, Hurley advised the newly formed KSG eGovernment Professional Interest Council (PIC), a student-run organization at the Kennedy School of Government. The group's mission is to emphasize the increasing importance of the Internet's role on domestic and international governance to the KSG student body, to increase exposure to and extend knowledge of eGovernment issues to the KSG student body, and to facilitate networking with public- and private-sector organizations involved with eGovernment. She also gave a presentation on "Using the Web in the Classroom," on October 26, 2000, as part of the KSG Faculty Teaching Seminar Series and served on the Kennedy School's Strategic Technology Committee.

Mayer-Schönberger taught executive education sessions on the new economy and information technology policy for the Saudi Arabian program, the Palestinian program, and the Kokkalis Leadership Network. Hurley spoke on "Information Media: Opportunities and Challenges" and "Privacy and Security," in June 2000, at the Media and American Democracy Institute, which was co-sponsored by the Kennedy School of Government and the Graduate School of Education. At the Wexner-Israel Seminar on the American Political System for government officials from Israel, she spoke on "Democracy and the Ubiquitous Information Environment," on February 8, 2001. She also taught sessions on "The Ubiquitous Information Environment: Opportunities and Challenges" and "Formulating Information Policy" for the Executive Program on Budgeting and Financial Management in the Public Sector (a program for government officials from developing

countries), which was held at the John F. Kennedy School of Government, on June 24 – July 27, 2001.

II. ENERGY TECHNOLOGY INNOVATION

The Energy Technology Innovation Project (ETIP) is a multi-year, interdisciplinary effort to develop, propose, and promote policy and institutional changes that support national and international efforts to stimulate energy technology innovation. Our goal is to contribute to the development of the global capacity to cooperatively and cost-effectively ameliorate the risks posed by current energy approaches, particularly the risks of greenhouse-gas-induced climate disruption, which are likely to be the most demanding driver of energy technology innovation in this century.

ETIP has ongoing research in two related areas: (1) Energy Technology Policy for a Greenhouse-Gas Constrained World and (2) Energy Technology Innovation Studies. In the first area, we are currently focused on energy policy strategies for the United States, China, and India, with a strong emphasis on the role of international cooperation in the development and deployment of cleaner energy systems. In the second area, through studies of the process of technology innovation in the energy sector, we examine how and under what conditions government policy can play an effective role in the development and deployment of cleaner energy technologies.

ETIP is located in the Belfer Center for Science and International Affairs (BCSIA) at Harvard's Kennedy School of Government and is a joint project of the BCSIA's programs on Science Technology and Public Policy (STPP) and Environment and Natural Resources Program (ENRP). The Project Director for ETIP is Dr. Vicki Norberg-Bohm. Other Co-Principal Investigators on ETIP grants are Dr. John P. Holdren, Teresa and John Heinz Professor of Environmental Policy and Faculty Chair of STPP, Dr. William Clark, Harvey Brooks Professor of International Science, Public Policy, and Human Development and former Faculty Chair of ENRP, and Henry Lee, the Jaidah Family Director of ENRP.

ETIP interacts with and complements a variety of related efforts in which project participants are engaged, including: work on international climate-policy issues being pursued in ENRP by Henry Lee and by ENRP Faculty Chair Robert Stavins; work under the Global Environmental Assessment Project, led by Prof. Clark, which includes a focus on the role of assessment in technology innovation; work in BCSIA and the Kennedy School's Center for International Development (CID) on the role of technological innovation in sustainable development (engaging, among others, Profs. Clark and Holdren and BCSIA/CID Senior Fellow Dr. Calestous Juma); the China and India Energy-Environment Projects of the Harvard campus-wide Committee on Environment; and the joint studies of energy cooperation opportunities being conducted by the National Academies of Science and Engineering of the United States, China, and India (in which efforts Prof. Holdren has been centrally involved).

Energy Technology Policy For A Greenhouse-Gas Constrained World (ETPGCW)

Over the past year, energy has gained considerable salience on national and international political agendas. Internationally, the third assessment from Working Group 1 of the

Intergovernmental Panel on Climate Change (IPCC) reinforced previous IPCC findings and provided the strongest warning yet that climate is changing due to human activities, with carbon dioxide from fossil-fuel burning the largest single contributor. On the domestic front, soaring natural gas and electricity prices and rolling blackouts in California have brought attention to near-term supply issues. As the United States crafts policies for solving domestic near-term energy problems, it is imperative that this be done in a manner that also addresses the longer-term and global challenge presented by climate change. The rejection of the Kyoto protocol by President Bush only increases the urgency of providing leadership and developing strategies both for U.S. domestic policies and institutions and for engaging the developing countries in a collaborative approach to greenhouse-gas limitation with the United States and other industrialized nations.

Energy Technology Policy for a Greenhouse-Gas-Constrained World (ETPGCW) is an analytical and policy development and outreach initiative that addresses these issues. Specifically, we are working to craft and catalyze a set of policies and institutions that can stimulate the research, development, and deployment of energy technologies that can address not only the climate issue, but the full range energy-related challenges of the 21st century, in all of their economic, environmental, and international-security dimensions. ETPGCW's program of analysis and policy development and promotion contains four main elements:

- (1) Characterizing recent patterns of energy research, development and deployment, both public and private, in selected key countries.
- (2) Identifying the energy research, development and deployment necessary to slow and ultimately reverse the growth of GHG emissions.
- (3) Developing specific proposals for changes in policies and institutions that could put more of the desired research, development and deployment in place, considering both international cooperation and domestic efforts.
- (4) Promoting the adoption of these proposals by means of submissions and presentations to decision-makers and opinion leaders in the selected countries and the United States, and in national and international workshops convened for this purpose.

ETPGCW co-PI John Holdren has been playing a major role in the national and international debate over adaptations of the energy sector to cope with the challenge of climate change. As a member of President Clinton's Council of Advisers on Science and Technology, he worked regularly with the President, the Vice President, and other senior members of the Administration to make the case for taking actions that set a course for the substantial reductions in carbon emissions that will be necessary in the future. During that time and since the change in administration, Holdren has been working with members of Congress, government leaders from other countries, industry leaders, academic experts, and others on approaches for reducing greenhouse-gas emissions from the energy sector. As detailed below, over the past year he has made presentations in governmental, intergovernmental and non-governmental forums all over the world as well as written extensively on the energy-climate challenge and policies that the United States should adopt to address these.

ETPGCW's research and outreach has been sponsored by a number of foundations, including the Energy Foundation, the Heinz Foundation, the Packard Foundation, and the Winslow

Foundation.

The United States: Setting the Agenda for the New Administration

As discussed in previous annual reports, the Energy Technology Innovation Project (ETIP) has provided substantial support for two studies by the President's Council of Advisors on Science and Technology (PCAST), both of which were chaired by ETIP principal investigator John Holdren, *Federal Energy R&D for the Challenges of the 21st Century* (released in November 1997), and *Powerful Partnerships: The Federal Role in International Cooperation and Energy Technology Innovation* (released in May 1999). These reports recommend a set of initiatives for developing an energy system that can address the climate change issue and other energy related challenges of this century. They represent a consensus opinion of a senior, bi-partisan group of energy experts from the public, private, and academic sectors.

President Bush's FY 2002 budget and the recently released energy policy of the Bush administration are at odds with many of the major recommendations of these reports. This change in administration policy has led to a redoubling of our efforts to advocate for the implementation of the R&D funding recommendations and the institutional and policy proposals outlined in the two reports. In July 2000, John Holdren made an invited presentation at the Aspen Institute Environmental Policy Forum on "The Energy-Climate Challenge and What To Do About It." This paper was subsequently published in a book-length set of environment policy recommendations presented to President Bush by the Aspen Institute. During the past year, he has published articles that provide recommendations for U.S. energy policy in a number of influential journals, including, *Science*, *Issues in Science and Technology*, *Environment*, and *Global Change*.

Throughout the past year, John Holdren also continued his work to make the case for the initiatives called for in the two PCAST reports, through numerous meetings with administration officials and members of Congress and their staff. This included providing testimony to Congress on three occasions: (1) the Subcommittee on Energy and Environment, Committee on Science, U.S. House of Representatives on "Improving U.S. Energy Security and Reducing Greenhouse-Gas Emissions: What Role for Nuclear Energy?" (July 2000); (2) the House Science Committee on "Energy Efficiency and Renewable Energy in the U.S. Energy Future" (February 2001); and (3) the Committee on Energy and Natural Resources, United States Senate on "Federal Energy Research and Development for the Challenges of the 21st Century: The 1997 PCAST Study and Its Relevance to Current Proposals."

These PCAST reports have had a substantial influence on Energy Policy over the past several years. The first report, *Federal Energy R&D for the Challenges of the 21st Century*, identified the energy/climate challenge as the most demanding driver of energy R&D needs, and proposed a ramping up of U.S. federal investments in applied energy technology R&D from its level of \$1.3 billion per year in fiscal year 1998 to \$2.4 billion in fiscal year 2000 in order to meet this challenge. The influence of this report on energy R&D budgets has been substantial. The president asked for 60% of the recommended increase in fiscal year 1999 and 50% in fiscal years 2000 and 2001. Congress ultimately passed budgets that contained close to half of the PCAST panel recommendations, leading to a total energy R&D budget of \$1.72 billion in FY 2001. The Bush administration submitted a budget that reversed this trend, dropping R&D levels to only

3% higher than those of 1998 (pre-PCAST levels). However, it appears that Congress will restore much of this R&D funding, a clear signal of the influence of the PCAST report and follow-on efforts to present its findings to congress.

The second PCAST report, *Powerful Partnerships*, makes the case for increased international cooperation on clean and efficient energy technologies in terms of economic, environmental, and international-security rationales, and shows that existing programs of cooperation are not commensurate in scope and scale with the challenges and opportunities (including, especially, those connected with the energy/climate-change linkage). It recommends an array of initiatives in capacity building, technology-specific R&D, technology demonstration, programs to buy-down the costs of advanced technologies with large public benefits, and financing mechanisms, entailing altogether a doubling of U.S. federal investments in international energy-technology cooperation between 1997 and 2001 and a tripling by 2005.

Following-up on one of the recommendations in *Powerful Partnerships*, in September 1999, President Clinton directed the relevant executive agencies to form a high-level interagency working group to review and coordinate the Federal government's efforts on international cooperation on energy innovation, including the preparation of budget requests to implement the PCAST panel's recommendations to develop specific programs to strengthen international energy cooperation. The working group proposed an International Clean Energy Initiative (ICEI), which was funded at the level of \$100 million in the President's FY2001 budget. Unfortunately, the Congressional response was mixed at best. Although many members expressed strong support for the ICEI, ultimately only \$8.5 million was appropriated.

INTERNATIONAL COOPERATION

In addition to continuing to promote the recommendations of the second PCAST report, *Powerful Partnerships*, our current work on international cooperation is focused on India and China, the two most populous nations, and both critical for addressing the energy-climate challenge. Over the past year, we have completed our work on characterizing the patterns of energy research, development deployment and demonstrations (RD3) in India and China, and have begun our work on specific energy technologies and sectors, including clean coal and clean vehicles. We have also strengthened our partnerships with institutions and researchers in both countries, which has contributed to the effectiveness of our work over the past year and provides opportunities for engagement and expansion as we move forward. A key theme of our country-focused work is the development of partnerships for addressing climate change. These include partnerships between industrialized and developing countries, and between the public and private sector. Our research and outreach have also focused on equity, one of the issues that must be resolved to effectively manage climate change.

India

John Holdren is the chair of the U.S. Committee of the US-India National Academies Committee on Energy and Environmental Cooperation, a joint project of the National Academies of both countries. In this capacity, John Holdren is developing collaborative studies and outreach on opportunities for U.S.-India cooperation on energy technology innovation. This committee had its first annual meeting in New Delhi in May 1999. At that meeting, the Joint Academies Committee planned a series of five bilateral workshops on the following topics: (1) clean fossil

fuels (including clean coal technologies and the potential of gas hydrates); (2) realistic applications of renewable energy sources; (3) approaches to reducing greenhouse-gas emissions (including use of the Clean Development Mechanism and other “win-win” approaches); (4) reducing electrical power shortfalls (including improvements in generation, transmission, and distribution); and (5) clean-vehicle technologies. Since then, John Holdren has met with leaders of this effort in India in Spring 2000 and Spring 2001 to plan for the next steps. These meetings included discussions with Prof. C. N. R. Rao, Indian co-chair of the Joint National Academies project and Dr. R. K. Pachauri, Director of the Tata Energy Research Institute and a member of the US-India National Academies Committee on Energy and Environmental Cooperation. In March 2001, he also met with U.S. Ambassador to India, Richard Celeste and U.S. Science Counselor Marco di Capuo to discuss initiatives on US-India energy cooperation.

ETIP fellow Dr. Ambuj Sagar, who leads the India component of ETPGCW, is working closely with John Holdren to plan a workshop of the U.S.-India National Academies Committee on Energy and Environmental Cooperation during the coming year. In preparation for this, he has completed a discussion paper on the energy RD3 landscape in India. This paper examines the state of the public and private energy sector RD3 efforts in India, placing current efforts within the context of India’s energy needs and evolving energy policies. He is also supporting work of the Joint Academies Committee through research on selected sectors and technologies that are crucial to India's energy future.

Ambuj Sagar’s work on capacity building provides additional input to the Joint Academies effort, as well as to ETPGCW more broadly. During the past year, he published a major review of capacity development for the environment for the *Annual Review of Energy and the Environment*. This review stresses the critical importance of building indigenous capacity for managing technological change as part of the strategies for tackling local and global environmental problems in developing countries. It concludes that strengthening domestic capabilities for policy research and innovation as well as for managing technological change may be particularly critical to allow for adaptation of policies and technologies to local conditions and needs. It also suggests a closer examination of innovative local experiments on environmental management in developing countries to provide lessons on how to develop and utilize capacity that works under the constrained conditions often found in these countries.

Dr. Sagar is also taking the lead on building a research linkage with the Climate Change group at the World Bank. He has been working closely with Dr. Ajay Mathur (Team Leader, Climate Change at the World Bank) to develop a research effort that aims to better understand the process of energy innovation in developing countries. This project conceptualizes energy technologies as engineered systems that comprise a core element and other relevant components. Based on this framework, it will examine the sources of innovation for specific energy technologies and systems, and the potential for developing technological capabilities within India for either core elements and/or components that can lead to the development and adoption of more sustainable energy technologies. We anticipate the results of this effort not only to be useful for the academic community by adding to the limited literature on energy technology innovation in developing countries, but also to provide insights on how to improve the efficiency and the effectiveness of policies and investments for energy and climate change at the World Bank and other national and international aid and development organizations. As part of this collaboration,

Dr. Ajay Mathur visited STPP in March 2001 and presented a seminar on his work on innovation in intermediate energy systems in India.

Dr. A. Gopalakrishnan, a senior practitioner with extensive experience in the Indian and U.S. energy sectors, joined us in September 2000 to work on U.S.-India collaboration for development and demonstration of clean coal technologies. As discussed in the PCAST report, *U.S. Federal Energy R&D*, IGCC is the most promising clean coal technology, because it is compatible with carbon sequestration and makes it possible to use coal in a manner that limits local and regional pollution problems. Both the Indian and the U.S. governments have invested in IGCC R&D over the past 2 decades. India has completed a pilot plant, while in the United States several IGCC full-scale plants have been demonstrated and commercialized. However, the U.S. technology is not directly applicable to India's high ash coal.

In September 2000, the DOE and India's Ministry of Power signed an agreement to jointly develop a project report for setting up an IGCC power plant in India, using Indian coals as feedstock. This project is part of a five year U.S.-Indian agreement for co-operation in coal sector development. Dr. Gopalakrishnan has been advising the U.S. DOE on this project. During the past year, he has met with the Assistant Secretary for International Affairs at the DOE and his staff, officials in the President's Office of Science & Technology (OSTP), and the staff at the National Energy Technology Laboratory. He also attended a workshop on IGCC power generation in India, jointly organized by the US National Academy of Sciences and the Indian National Academy of Science, as a part of the ongoing interactions between these two academies on energy sector development in India. In each of these venues, based on his experience as General Manager of R&D and Executive Director of Advanced Research at Bharat Heavy Electricals Limited (BHEL), Dr. Gopalakrishnan has been providing a more accurate picture of the strengths and weaknesses of the Indian coal R&D efforts over the past two decades and of the factors that have shaped the Indian program. Through discussions centered on evaluating both the US & Indian clean coal technology efforts to date, Dr. Gopalakrishnan contributed suggestions on how the complementary strengths of each country's efforts can be best used in a future joint program.

The US Agency for International Development (AID) office in New Delhi has been entrusted with the task of managing the Indo-U.S. IGCC Project and is in the process of finalizing a Request for Proposal (RFP) for the preparation of the project report for the Indian IGCC plant. Dr. Gopalakrishnan will provide comments to DOE on the RFP, and expects to be called in to assist in the evaluation of the bids.

CHINA

Over the past year, this part of our project has developed considerably, with the addition of Dr. Jimin Zhao and Ms. Kelly Sims as research fellows, and with an extended visit from Mr. Xu Jing, the Director of the Division of Energy and Transportation, Department of High-Tech Development and Industrialization, China's Ministry of Science and Technology (MOST). We have completed our analysis of China's energy RD3 landscape, including an assessment of international cooperation between China and industrialized countries in energy RD3. This work has led to the identification of two sectors - clean coal and clean vehicles - in which we are developing collaborations with MOST to pursue in-depth policy and outreach in the coming

years.

John Holdren has continued to engage in policy and research discussions on Chinese energy futures and the challenges and opportunities for US-China collaboration in the energy sector. In January 2001, he made two invited presentations at the *Sino-U.S. Workshop on Climate Change Science & Modeling* in Shanghai, China, a meeting sponsored by the Office of Science and Technology Policy, Executive Office of the President of the United States, and the Ministry of Science and Technology, Government of China. John Holdren gave the lead-off U.S. presentation on "Climate Science in Context: Perspectives from Recent U.S. Government Assessments" and a second presentation on "Climate-Change Science in China and the United States: An Introduction to Research Needs and Cooperation Possibilities."

Dr. Jimin Zhao, who leads the China component of ETPGCW, focused her work this year on analyzing China's energy RD3 institutions and policy. Her research consisted of extensive archival work and fieldwork in Beijing, including interviews with over 30 government officials, academic and institute researchers, corporate staff, and others. She has written 3 working papers that present a systemic and detailed view of China's energy policies and institutions. These papers provide a much needed, but heretofore lacking basis of understanding to the many organizations and researchers working on energy and climate in China.

The first paper, "Energy Institutional and Policy Development in China," provides a 30-year history of energy policy in China, including a detailed discussion of current policies and institutions. It examines in detail how economic reform has changed China's energy institutions from a strictly government controlled and centrally planned system to a less government controlled and market-oriented system. It also analyzed the shift in China's energy-related policies from a focus on strategies for increasing energy supply and energy efficiency, to a focus on diversifying energy sources and environmental protection.

The second paper, "China's Energy Science and Technology Development," looks specifically at institutions for research and development. It analyzes the status of China's energy technologies and the technological gap between China and the industrialized countries. Support for energy R&D has not been a very high profile activity in China, but has been one of the most important areas in China's national R&D programs. China does not yet have major energy R&D programs, although extensive efforts have been made to deploy technologies that increase energy efficiency and develop new and renewable energy technologies. Jimin Zhao is also producing a third working paper, with Kelly Sims, on China's energy system. This paper presents data on energy consumption and production patterns in China.

Over the past year, based on her dissertation work, Jimin Zhao has also made numerous presentations on implementing the Montreal protocol in China, including a presentation at the Professional Association for China Environment 2000 workshop in Washington, DC in September and the workshop on "Increasing the Contribution of International Financial Institutions to Sustainable Development in the Run-up to the World Summit on Sustainable Development" at the Royal Institute of International Affairs, London in June. She will be applying lessons from this work to her work on policy for reducing greenhouse gas emissions from China's energy sector.

Mr. Xu Jing, the Director of the Division of Energy and Transportation, Department of High-Tech Development and Industrialization, China's Ministry of Science and Technology (MOST), joined us as a visiting scholar from January through June, 2001. During his stay, he worked closely with our research fellows and senior staff to share information on the current status of research, development and deployment of clean energy technology in China and on Chinese priorities for international collaboration on energy technology policy. Through this dialogue we have developed a proposal for a joint program of policy analysis and outreach to support China's efforts to develop and deploy clean vehicle and clean coal technologies. While there is a considerable body of work on the technological aspects of clean vehicles and clean coal, there remains a pressing need for policy analysis. Our research strategy is to address this need through a collaboration involving researchers from ETIP, MOST, and several Chinese research institutions and universities.

Ms. Kelly Sims, a doctoral candidate at the Fletcher School of Law and Diplomacy, joined us as a research assistant for the past year, and will be returning as a research fellow in September 2001. During this year, Ms. Sims spent two months in China, conducting interviews on American influence in the Chinese energy system. In Nov. 2000, she was an invited contributor at a meeting on *Scenarios for the Future of United States-China Relations*, sponsored by the Nautilus Institute for Security and Sustainable Development, Fudan University, Tsinghua University, and the South-North Institute for Sustainable Development, where she spoke on energy and climate change. Ms. Sims is completing an in-depth working paper on U.S.-China Energy Cooperation and has an article about US-Chinese energy cooperation forthcoming in the *China Environment Series* entitled "Charge to the Bush Administration." She also co-authored, with Dr. William Moomaw, a revision and update of Europa Publishers' "A-Z of the Environment." During the past year, she has also served as a Teaching Fellow for the seminar on Climate Change and International Development sponsored by the Harvard Institute for International Development, and as a teaching assistant at Harvard University and Tufts University for two different classes on international energy systems.

EQUITY

The U.S. government, by requiring the "meaningful participation" of developing countries as a condition for going forward with an international agreement on reducing greenhouse gases, has brought issues of equity to the front of the current debate policy. The issue of equity is of great importance to developing countries as well, as they bear little responsibility for the current accumulation of greenhouse gases and have limited resources to devote to its mitigation. Clearly, an equitable burden-sharing arrangement must be the basis of any future international agreement that includes commitments and timeframes for emission reductions by developing countries. Principal investigator John Holdren and research fellow Ambuj Sagar have been working on this issue. John Holdren was one of a group of distinguished scholars to argue in *Science* that an equitable climate regime would be based on a per capita allocation scheme. Ambuj Sagar has further elaborated on equitable allocation in an article in *Climactic Change*, in which he argues for three additional criteria for an equitable scheme: transparency, consistency and applicability in an objective manner across countries.

Ambuj Sagar has also written on two other equity issues: liability for climate-related impacts and

the needs of those who do not contribute significantly to climate change. On the liability issue, the problem has been twofold: different parties have different perceptions of risk from a changing climate, and the ones bearing the costs of climate impacts will often not be the ones responsible for the problem. Ambuj Sagar and colleague S. Adamson have developed a proposal that uses tradable contingent securities, in which the future price of the security is linked to the state of the climate, to account for some of the uncertainty and risk issues, and in one variation, to serve as the basis for an insurance fund to compensate climate-affected parties. A second and perhaps the most neglected aspect of the equity issue is the substantial fraction of the world's population that has been excluded from the climate debate—the estimated two billion poor who have low levels of energy consumption and rely mainly on biomass and as a result do not emit significant quantities of greenhouse gases. Their energy use patterns, although climate-friendly, have substantial adverse impacts on their health and lives through exposure to indoor air pollution and disproportionately high time and financial expenditures on obtaining energy supplies. Sagar has argued that climate deliberations must include the needs and concerns of these marginalized groups – something that is not happening at present.

TECHNOLOGY INNOVATION STUDIES

In the area of technology innovation studies, our work focuses on better understanding the process of technology innovation, with an emphasis on gaining insights into how to design government policies and institutions to stimulate the development and deployment of cleaner energy technologies. We have two DOE sponsored research projects in this area: *Technology Innovation for Global Change: the Role of Assessment, R&D and Regulation*, sponsored by DOE's Office of Science, and *Government-Initiated Voluntary Programs and Public/Private Collaborations and Partnerships: Assessment of the Elements of Successful Programs*, sponsored by DOE's Office of Energy Efficiency and Renewable Energy.

TECHNOLOGY INNOVATION FOR GLOBAL CHANGE

This research project seeks to better understand how and under what conditions public policy can effectively and efficiently support and stimulate private sector investments in the development and adoption of environmentally-enhancing radical technological innovations. Our focus is on three causal pathways through which government policy can influence strategic R&D decisions of private firms: (a) demand-pull policies, which are aimed at creating/expanding markets for new technologies, such as production tax incentives, environmental regulation, information dissemination, technical assistance, and market development for overseas investments; (b) supply-push policies, which increase direct investments in R&D, including public funding of R&D and R&D tax incentives; and (c) assessment activities, which develop credible information regarding current or possible future environmental impacts from products or processes, for example, linked to concerns about global climate change, and thereby highlight the likely future needs for improved environmental technologies. The project is designed to explore the conditions under which, and ways in which, each pathway and the interplay among them affect firms' R&D investment behavior and to offer practical guidance for government policy designed to promote innovation to address environmental change.

The project explores these issues through 30-year histories of the development of three technologies: gas turbines, wind turbines and solar photovoltaics, examining the decisions of

firms to invest in innovation and to become lead adopters of these three "clean" energy technologies. We are in the final stages of this project, having completed all archival work, government interviews and most importantly, in-depth interviews with senior staff at nine firms, including two gas turbine manufacturers and one gas turbine consumer, two wind turbine companies, and four solar photovoltaics firms.

Over the past year, co-principle investigator Vicki Norberg-Bohm presented initial results in several venues, including the DOE Office of Power Technologies, the American Association for the Advancement of Science Annual Meeting, and the Association for Public Policy Analysis and Management Annual Research Conference. Vicki Norberg-Bohm and research fellow Robert Margolis have completed a working paper focusing on two of these three pathways—supply-push policies and demand-pull policies. Articles and a book that explores all three pathways and their interaction will follow over the next year.

Our initial analysis of the first two pathways and their interaction has shed light on the role of government policy in closing the "gap" between invention and commercialization. This gap has recently been called "the valley of death," to describe the fact that many technologies perish after invention but prior to commercialization. For clean energy technologies, this valley consists of funding, technical and market gaps.

Our research found that government policies and programs played a fundamental role in closing all three aspects of this gap. In terms of R&D funding, government support was critical for moving technologies from concept to proof of principal. For the firms in our sample, from one-third to almost 100 percent of the research budget came from public support and private sector funding was often contingent on winning government contracts. In terms of the technology gap, we found that government laboratories provided important complementary assets to private sector efforts in technology innovation, including testing facilities, design review, and in some cases technological knowledge. In terms of the market gap, we found that government support for markets had a positive feedback to private sector investments in technology innovation. This is despite the fact that private funders often expressed cautiousness about investing in technology innovation for government created markets, due to the uncertainty in level and timeframe. In sum, our research shows that there is the possibility of creating a virtuous cycle in which government programs and policies that simultaneously support both R&D and markets can stimulate private sector investments that move radical innovations through the learning process that is necessary for them to become commercially competitive.

VOLUNTARY PROGRAMS AND PUBLIC/PRIVATE PARTNERSHIPS

This project focuses on evaluating the effectiveness of a new set of policy approaches that are neither market mechanisms, nor standards (command and control), but rather rely on voluntary, collaborative and information-based approaches. In both the United States and Europe, we now have over a decade of experimentation with these new policy approaches. It is thus timely to take stock of their effectiveness and make recommendations for future practice. Our research focuses particularly on evaluating whether and under what circumstances these approaches can stimulate the development and diffusion of environmentally superior technologies and provide opportunities and incentives for private-sector leadership in environmental protection. In order

to accomplish this evaluation, the project has two components: (1) a workshop evaluating and comparing U.S. and European experience with this new set of policy mechanisms, and (2) analysis of two of DOE's voluntary and partnership programs.

The workshop, "*Voluntary, Collaborative and Information-Based Policies: Lessons and Next Steps for Environmental and Energy Policy in the United States and Europe*," was held on May 10-12, 2001 at Harvard University's John F. Kennedy School of Government. ETIP partnered with the Regulation Program at the Center for Business and Government at the Kennedy School and the Center for Clean Technology and Environmental Policy at the University of Twente in the Netherlands to organize this workshop. The workshop brought together scholars and senior practitioners from government, industry, and the NGO community from the United States and Europe to examine the effectiveness of this set of innovative policy mechanisms. While the United States and many European countries are undertaking a number of experiments in voluntary, collaborative and information-based policy, the specific ways in which these are designed and implemented differ considerably. In this workshop, we began to map, compare and explain the differences and similarities on both sides of the Atlantic. This provided a rich range of experience from which to draw lessons for future policy design.

The workshop was organized into five panels: voluntary approaches, industry sector collaboration, collaborative approaches for technology development, information disclosure policy, and environmental management systems. Each panel had two or three presentations by scholars on specific policies or programs, followed by a panel of three or four presentation by discussants from government, industry and NGOs. Vicki Norberg-Bohm, along with the co-organizer of the workshop, Theo de Bruijn from the University of Twente, have written a workshop report that draws key lessons, and are in the process of editing a book based on the papers presented at the workshop.

As part of this workshop, co-principle investigator Vicki Norberg-Bohm and research fellow Robert Margolis presented their research on three DOE sponsored R&D collaborations: the Advanced Turbine Systems (ATS) program, the Photovoltaic Manufacturing Technology (PVMaT) project, and the Thin-Film PV Partnership project. These R&D programs are part of the evolving paradigm for government sponsored R&D, which emphasizes collaboration and partnership, and includes: cost-sharing, transfer of intellectual property rights to the private sector, funding closer to commercialization, and an increased focus on manufacturing. We conclude that through collaborative goal setting and implementation, these partnerships moved industry at a faster pace than it would have otherwise gone in the development and commercialization of radical technological innovations. For both gas turbines and PV, this resulted in having better products available for the current rapidly expanding market. In order to achieve these results, the government needed to provide significant cost-sharing, and industry had to believe that the goals were reachable and that the resulting technology would be competitive in the market. In this sense, these programs operated in tandem with energy and environmental regulation that was creating markets for these technologies, both at home and abroad.

The Energy Technology Innovation Project has been made possible through generous support from the U.S. Department of Energy, the Energy Foundation, the Heinz Foundation, the Packard Foundation, and the Winslow Foundation.

III. MANAGING THE ATOM

The Managing the Atom Project is a multi-year, interdisciplinary research and policy outreach initiative focusing on key topics in two broad areas that are central to the future of nuclear arms reductions, nonproliferation, and nuclear energy:

- **Nuclear weapons-energy linkages:** Managing, monitoring, protecting, and disposing of nuclear materials in the military and civilian sectors (including weapons-usable materials in forms ranging from intact nuclear warheads to spent fuel and other nuclear wastes), and managing potentially weapons-related nuclear technology and knowledge, under current conditions and various possible futures for nuclear arms limitations and nuclear energy; and adapting U.S. nuclear nonproliferation and nuclear trade policies for maximum effectiveness in the post-Cold War period.
- **Nuclear decision-making:** Improving the performance of key agencies that make and oversee nuclear policies; reducing nuclear secrecy that is no longer needed; increasing public input into nuclear decision-making; finding ways to build consensus around urgently needed actions; and exploring alternative approaches to democratic governance of the nuclear enterprise.

Managing the Atom takes a strategic approach, concentrating on issues that are both (1) central to future policy and (2) fruitful targets for additional work, because they either are under examined, or the focus of such intense conflict that unbiased review has been difficult.

While housed in STPP, Managing the Atom addresses core issues that reach across the Belfer Center and beyond, and hence is a joint effort between STPP, the International Security Program (ISP), and the Environment and Natural Resources Program (ENRP), with the directors of all three programs serving as co-principal investigators.

With a new U.S. administration coming to office, the 2000-2001 academic year was a time of major shifts on policies central to the future of nuclear weapons and nuclear energy. The Bush administration came to office supporting unilateral reductions in nuclear arms but opposing negotiated treaties that would limit U.S. flexibility; opposes the Comprehensive Test Ban Treaty; and is single-mindedly focused on “moving beyond” the Antiballistic Missile Treaty to test and build large-scale missile defenses. The outcome of these new policies is not yet clear, but crises that would undermine or destroy ongoing nonproliferation cooperation with both Russia and China remain a distinct possibility.

In the civilian sphere, the Bush administration announced an energy plan that calls for building up to 1,900 new power plants over the next two decades, including an expansion of U.S. nuclear generation capacity – a marked contrast to the Clinton administration’s arms-length approach to nuclear power. This endorsement has amplified already-rising optimism in the U.S. nuclear

industry (based on rising fossil fuel costs, improved nuclear plant performance, and growing concern among opinion leaders about carbon-induced climate change) that new reactors may be licensed and built starting in the next several years.

Events in other key countries in 2000-2001 also had major nuclear policy implications. Russia ratified START II and the Comprehensive Test Ban Treaty, and called for deep cuts in nuclear arms. Russian President Vladimir Putin forced out Minister of Atomic Energy Evgeniy Adamov, who had lobbied hard for nuclear exports that called Russia's nonproliferation commitments into question, and pushed through a law allowing commercial imports of spent fuel to Russia – soon to be a major topic of U.S.-Russian negotiation, as the United States has veto rights over most of the spent fuel Russia might import. Putin continued to support cooperative threat reduction activities that brought tangible benefits to Russia — such as the U.S. purchase of excess uranium from dismantled Russian weapons — but also presided over a continuing crackdown on information exchanges and access to sensitive facilities, making cooperation far more difficult.

Elsewhere, a number of de facto nuclear weapons states and nuclear aspirants continued to challenge the nonproliferation regime. India and Pakistan resisted efforts by the Clinton and Bush administrations to persuade them to accept binding nuclear restraints (although the two countries did state that they would maintain an informal moratorium on further nuclear tests). After the Clinton administration appeared within reach of a deal with North Korea to end Pyongyang's missile programs, the Bush administration called a halt to talks before eventually deciding to restart them with new, more stringent demands – an approach the North has not accepted. International support for continued sanctions on Iraq weakened, and an effort by Secretary of State Colin Powell to craft a new “smart sanctions” regime that could garner more support ran into Russian opposition on the Security Council. The United States continued to assert that Iran was seeking a variety of technologies for a clandestine nuclear weapons program, notably from Russia.

Despite new enthusiasm among advocates in the United States, and the pressures of climate change concern and fossil fuel prices that contributed to it, it was not a banner year for nuclear energy in much of the rest of the world. The German government reached a final agreement with its utilities to phase out nuclear energy entirely over several decades. In Japan, continuing political reverberations from the 1999 accident at Tokai-mura led to a referendum rejecting the use of plutonium fuel at a key power plant, throwing Japan's fuel cycle policy into question; moreover, with deregulation expected to lead to increased competition, some Japanese utilities began to rethink their plans for new nuclear plants. China continued with the plants it had already ordered, but showed no signs of ordering more, indicating that previous projections of major new nuclear business from China were clearly unrealistic.

In the sphere of democratic management, the major issue of the preceding year – the U.S. government's investigation of alleged Chinese spying at DOE nuclear weapon laboratories – ended with a whimper as the government dropped all but one of its charges against Los Alamos scientist Wen Ho Lee, the focus of the inquiry. However, widespread polygraph programs and other security upgrades at the laboratories remained in place, obstructing international cooperative programs crucial to U.S. security and undermining the labs' ability to attract and

retain skilled personnel. The most significant new development in this area in 2000-2001 was the Russian government's increasingly intolerant attitude toward any external criticism of official nuclear policies. Notably, Russian environmental groups collected 2.5 million signatures on petitions opposing proposals to import and store foreign nuclear waste for profit, but a court invalidated just enough to reduce the number below the threshold of 2 million signatures that would have triggered a mandatory public referendum. The Russian government also pursued investigations and legal cases against several independent environmental and arms control researchers, whom it criticized as security threats, significantly chilling the climate for independent domestic analysis of Russian nuclear policies.

NUCLEAR WEAPONS-ENERGY LINKAGES

Managing Cold War Legacies – Warheads, Materials, Complexes

Nothing could be more central to U.S. security than ensuring that the nuclear legacies of the Cold War are securely managed, and that the essential ingredients of nuclear weapons do not fall into hostile hands. In 2000-2001, MTA participants worked to prevent the spread of "loose nukes" and build the basis for deep, transparent, and irreversible reductions in stockpiles of nuclear warheads and weapons-usable nuclear materials. This work fell into eight principal categories:

A strategic plan for an expanded nuclear security effort. Building on the comprehensive agenda for accelerated nuclear security cooperation laid out by Matthew Bunn in last year's *The Next Wave: Urgently Needed New Steps to Control Warheads and Fissile Materials*, MTA participants continued to make the case for accelerated action to address these threats to international security through (a) briefings, presentations, and meetings with key representatives of both major parties during the 2000 presidential campaign (BCSIA Director Graham Allison co-chaired Vice President Gore's group of advisors on Russia policy), and key officials of the new Bush administration; and (b) extensive work with National Security Council (NSC) staff and officials in other agencies to make the case for an accelerated effort, suggest new ideas, and propose reforms of existing programs as the Bush administration reviewed cooperative threat reduction programs in the former Soviet Union.

In addition, as noted elsewhere in this report, Managing the Atom participants worked closely with former Senator Sam Nunn, CNN founder Ted Turner, and former Undersecretary of Energy Charles Curtis in their "scoping study" leading to the founding of the Nuclear Threat Initiative (NTI). At their request, Matthew Bunn prepared a paper that laid out a comprehensive agenda for NTI to address security threats posed by nuclear materials worldwide. NTI has adopted many of these recommendations, and Bunn is now working as a part-time consultant to NTI to help the organization address the "loose nukes" agenda and develop other steps to reduce nuclear risks.

MTA participants also worked in 2000 with a senior bipartisan task force, requested by then-Secretary of Energy Bill Richardson and co-chaired by former Senator Howard Baker and former White House counsel Lloyd Cutler, which reviewed the Energy Department's nonproliferation programs in Russia. BCSIA Director Graham T. Allison served on the panel, and Matthew Bunn briefed the group, provided background information and recommendations, and worked with panel members to draft and edit their report, which was released in January 2001. The panel warned that "the most urgent unmet national security threat to the United States

today is the danger that weapons of mass destruction or weapons-usable material in Russia could be stolen and sold to terrorists or hostile nation states,” and called for a drastically expanded and accelerated effort to cooperate with Russia to address these threats. Specifically, the report called on the President to “formulate a strategic plan to secure and/or neutralize in the next eight to ten years all nuclear weapons-usable material located in Russia and to prevent the outflow from Russia of scientific expertise that could be used for nuclear or other weapons of mass destruction.” (The full report is available at <http://www.hr.doe.gov/seab/rusrpt.pdf>.)

Given the panel’s bipartisan credentials and forceful recommendations, the Baker-Cutler report had a substantial impact. Dozens of press accounts of the report appeared in major newspapers. Panel members briefed a wide range of senior policy makers, including Cabinet officials, the White House staff, and members of Congress. The Senate Foreign Relations Committee held a hearing that highlighted the report’s conclusions, and Secretary of State Colin Powell stated during his confirmation hearing, “I think that they’re right on...I agree with them entirely.” In the wake of these meetings, the House Energy and Water Appropriations Subcommittee (which in the past had repeatedly cut funds for DOE nonproliferation programs in Russia below the department’s requested levels) provided substantially more than the Bush administration had requested for these activities in fiscal year (FY) 2002.

Securing Russia’s nuclear material. Russia’s economy stabilized in 2000-2001 after several years of turmoil following its August 1998 crisis, but the continuing threat of nuclear theft makes it urgently important to accelerate and strengthen efforts to secure and account for nuclear materials in the former Soviet Union — known formally as the material protection, control, and accounting (MPC&A) program. With that goal in mind, in August 2000 the Russian-American Nuclear Security Advisory Council (RANSAC) published a major report co-authored by Matthew Bunn with Oleg Bukharin of Princeton University and Kenneth N. Luongo of RANSAC, *Renewing the Partnership: Recommendations for Accelerated Action To Secure Nuclear Material in the Former Soviet Union*. The report provided a comprehensive assessment of the MPC&A program and specific recommendations for accelerating its progress. It also identified DOE policies that had slowed or undermined progress.

Bunn, Bukharin, and Luongo briefed DOE officials before the report’s release, provided copies to experts at the 2000 Annual Meeting of the Institute for Nuclear Materials Management (INMM), the association of professionals responsible for safeguarding nuclear materials, and held a press conference in Washington, DC to release the report. The study received wide press coverage and was praised by both the U.S. program manager and Russian participants. DOE has moved to implement a number of the report’s key recommendations. Bunn presented a progress report on the MPC&A program at the 2001 meeting of the Institute for Nuclear Materials Management. Bunn, Bukharin, and Luongo have continued to advise the program manager, other executive branch staff, congressional staff, General Accounting Office investigators, and the press on the status of this critical effort and steps that remain to be taken.

MTA participants also worked to highlight continuing nuclear security problems in Russia and combat “donor fatigue” on the part of key countries with the resources to address the issue. Steven Miller testified to the Subcommittee on Disarmament, Arms Control, and Nonproliferation of the Committee on Foreign Affairs of the German Bundestag in September

2000, asserting that Russia posed continuing proliferation threats, that remedies were possible, and that action was required. Predoctoral fellow Nathan Busch authored a report, *The Russian Nuclear Complex: Deterioration and Disarray*, scheduled for publication by Los Alamos National Laboratory in the fall of 2001.

Funding for nuclear materials security programs. Shortly after taking office, the Bush administration released a budget for FY2002 that reduced funding for virtually all U.S.-Russian programs designed to improve security for nuclear material – despite President Bush’s campaign pledge to ask Congress to *increase* support for such efforts. MTA participants worked with RANSAC to outline the budget cuts in detail, explain the merits of programs targeted for reduction to key Congressional staff and administration officials, and suggest reforms. As of the August 2001 summer recess, it appeared likely that Congress would restore most of the reductions, but the dramatic expansion of these efforts that is urgently needed still awaits White House leadership.

New initiatives: HEU Rapid Blend-Down. In 2000-2001, Managing the Atom participants worked to make the case for a new initiative to double or triple the pace at which Russia’s excess bomb uranium is destroyed — a shift that could permanently eliminate the proliferation risks posed by excess highly enriched uranium in Russia within a few years. This proposal was a centerpiece of the Baker-Cutler report, and the Turner/Nunn Nuclear Threat Initiative has put high priority on financing initial steps to get the process going. Matthew Bunn provided memos and analyses to NSC officials, congressional staff, and others, and helped NTI map out a proposed action plan. Reports suggest that the Bush administration may pursue some version of this concept as part of its overall review of the U.S. agreement to purchase excess Russian bomb-grade uranium.

New initiatives: A Debt-for-Security Swap. In 1999-2000, Managing the Atom participants identified a “debt for security swap” (in which a portion of Russia’s foreign debts would be canceled in return for Russian payments into a fund to support agreed nonproliferation and arms reduction projects, modeled on past “debt for environment” swaps) as a potentially attractive source of new revenues to fund threat reduction activities. MTA participants pursued this idea energetically in 2000-2001, working with experts from DOE’s Pacific Northwest National Laboratory who had independently developed a similar proposal. MTA provided memos and analyses to National Security Council staff; persuaded the Nuclear Threat Initiative to adopt a debt swap as an early priority; and worked closely with the offices of Sen. Joseph Biden (D-DE), now chair of the Senate Foreign Relations Committee, and Sen. Richard Lugar (R-IN), one of the committee’s senior Republican members. Biden and Lugar have endorsed the debt-for-security swap concept, written jointly to President Bush urging him to launch such an initiative, and are drafting legislation to direct the administration to negotiate such a swap and authorize funds to pay for the initial debt reduction.

New steps to monitor nuclear reductions. Steps to monitor stockpiles of nuclear weapons and the fissile materials needed to make them will be an essential element of achieving deep, transparent, and irreversible nuclear arms reductions. MTA co-principal investigator John Holdren chairs the U.S. National Academy of Sciences’ Committee on International Security and Arms Control (CISAC), which is conducting a study of the requirements for an effective “all-

warhead counting regime” to provide the basis for very deep reductions in nuclear arms (as recommended in CISAC’s 1997 report, *The Future of U.S. Nuclear Weapons Policy*). The study is co-chaired by Managing the Atom affiliate Steve Fetter of the University of Maryland, and Matthew Bunn is a consultant to the effort. Bunn made a presentation at a meeting of the committee in January 2001 on lessons from U.S.-Russian negotiations in this area about practical near-term steps toward the ideal objectives outlined in the report. The study is expected to be published in 2002.

At the same time, as discussed above, the Bush administration is placing increased emphasis on accomplishing arms reductions through informal reciprocal initiatives rather than negotiated treaties. Bunn participated in a major U.S.-Russian effort, led by Rose Gottemoeller of the Carnegie Endowment for International Peace, to identify monitoring and transparency measures that could be undertaken to build confidence that such reciprocal reduction initiatives were actually being carried out. This effort generated a memorandum to the Bush and Putin governments in July, 2001, outlining steps that could be taken.

Reducing stockpiles of excess plutonium. In 2000-2001, efforts to reduce U.S. and Russian stockpiles of excess weapons plutonium struggled forward, although by mid-2001 the future of this initiative was very much in doubt. In September 2000, after several years of negotiations, Washington and Moscow finally signed an agreement outlining approaches each side would use to transform excess weapons plutonium into forms that were no more usable for nuclear weapons than plutonium in spent commercial reactor fuel (thus bringing the material to the so-called “spent fuel standard.” But efforts to raise international financing for the estimated \$2 billion that Russian needs to implement this agreement have fallen short. Moreover, Russia does not have enough modern reactors to burn all of its excess plutonium (its chosen disposition method) at a reasonable rate, and it is not clear whether arrangements to burn Russian plutonium as fuel in other countries can be worked out. The U.S. plutonium immobilization program, which aimed to develop methods of encasing excess plutonium in ceramic for disposition in an underground repository, continued to encounter obstacles and was placed in cold standby (effectively terminated) in early 2001. By July, press reports on the Bush administration’s review of threat reduction programs suggested that the Bush administration would abandon the near-term reactor track as well, in favor of longer-term development of more advanced plutonium-burning reactors.

MTA participants continued working to move the plutonium disposition program forward as these events unfolded. Matthew Bunn worked closely with DOE’s Office of Materials Disposition to analyze and develop arguments for and against various policy approaches as input to the Bush administration’s review of the program. At DOE’s request, Bunn also wrote an in-depth analysis of various options for purchases or “swaps” of Russian plutonium as approaches to the disposition objective.

In 2001, a National Academy of Sciences committee on the “spent fuel standard,” which was chaired by John P. Holdren and included former MTA fellow Allison Macfarlane, released its final report. The report provided detailed guidelines for assessing which approaches to plutonium disposition would meet this important security standard, and recommended new tests to ensure that DOE’s proposed immobilization forms would meet the standard. Although U.S.

immobilization efforts are now on hold, the framework outlined in this report is being considered in other countries attempting to deal with large excess plutonium stockpiles, such as Germany and the United Kingdom.

Russian spent fuel imports. Over the past year, controversy has raged in Russia over a proposal to import foreign spent fuel for storage, reprocessing, or disposal – a project expected to bring in \$10-20 billion in revenue. Despite public opposition levels of 75 to 90 percent, the Russian Duma approved legislation authorizing such imports in the spring of 2001 and President Putin signed it in early July. However, most of the fuel that represents Russia’s potential market can only be shipped with U.S. government consent because it was fabricated in the United States or irradiated in U.S.-origin nuclear reactors. The Russian proposal thus raises key issues for U.S. policy, and offers the United States billions of dollars in negotiating leverage. Throughout the year, MTA participants worked to explore the policy implications of Russian spent fuel imports, particularly options under which large portions of the revenues could be set aside to fund urgent nonproliferation and disarmament initiatives. A detailed analysis of the advantages and disadvantages of different proposals for shipping spent fuel to Russia was published as part of a broader report on storage of spent fuel, described below. Matthew Bunn presented an updated analysis of the issue at the 2001 annual meeting of the Institute for Nuclear Materials Management, and worked to ensure that administration officials were aware of the issues and the choices available to them.

Nuclear Nonproliferation: Key Issues and Hard Cases

New directions in nonproliferation policy. The new Bush team has focused intensely on deploying national missile defenses as its principal answer to the problem of proliferation, relegating efforts to stem the spread of weapons of mass destruction to a lower priority and devoting substantially less person-power to these programs than was the case during the Clinton administration. In the spring of 2001, Matthew Bunn wrote a detailed review of the Bush administration’s approach to nonproliferation policy which will be published in the journal of Moscow’s Center for Policy Studies, *Yaderny Kontrol (Nuclear Control)* in September. A shortened version was widely distributed as one of the Center’s *Arms Control Letters*. Steven Miller published an article on “The Frayed Nuclear Nonproliferation Regime,” in the International Institute for Strategic Studies’ *Strategic Survey, 2000-2001*. Both of these assessments highlighted the impermanent nature of recent nonproliferation advances and the potential for a serious erosion of international consensus on whether and how to strengthen the regime — particularly if major actors such as the United States and Russia subordinate their nonproliferation commitments to other national objectives.

IMPASSE ON NUCLEAR ARMS REDUCTIONS

Even before the U.S. transition from Clinton to Bush, the nuclear arms reduction process had been at a standstill for years, with many experts warning that momentum generated by earlier successes (such as conclusion of the START II and Comprehensive Test Ban treaties and extension of the nuclear Non-Proliferation Treaty) was dwindling. This concern was the driving motivation for Ted Turner’s decision in mid-2000 to found the Nuclear Threat Initiative (NTI) under the direction of former Senator Sam Nunn. NTI plans to make targeted investments

totaling \$50 million from 2001-2005 in an effort to jump-start progress on reducing nuclear threats. MTA participants, including John Holdren, Steven Miller, Matthew Bunn, Jennifer Weeks, former MTA fellow James Walsh, and BCSIA's Graham Allison and John Reppert participated in a workshop with Turner, Nunn, and other NTI officials at Harvard in October 2000 to offer recommendations for framing the organization's mission, identify specific high-priority agenda items, and suggest innovative philanthropic approaches to maximize NTI's impact. As noted above, NTI has adopted a number of these recommendations, including several new policy goals (rapid HEU blend-down, a debt-for-security swap, and rapidly consolidating small, vulnerable HEU stockpiles), and is considering others, including launching a new award series to honor major contributions to disarmament.

MTA participants highlighted the need to re-energize the disarmament process in speeches and publications throughout the year. Steven Miller authored "A Comprehensive Approach to Nuclear Arms Control," in *Arms Control and Disarmament: A New Conceptual Approach*, published in September by the United Nations Department for Disarmament Affairs. Holdren also chaired meetings of the National Academy of Science's Committee on International Security and Arms Control with counterpart groups from Russia, China, and India. These meetings provide important opportunities to maintain substantive dialogues between U.S. nuclear experts and international counterparts even when their respective governments are failing to agree on further steps. Additionally, they often are accompanied by private meetings with high-level officials that help promote mutual insights into nations' declared policies. Holdren also delivered an invited presentation to the Pugwash Symposium on the Future of Nuclear Arms Control in New Delhi in March 2001 on obstacles to achieving a prohibition on nuclear weapons – a ban advocated by many nations.

Banning Nuclear Testing. In 2000-2001, John Holdren chaired a special committee assembled by the National Research Council, at the request of special advisor to the President and former Chairman of the Joint Chiefs of Staff John Shalikashvili, to examine technical issues related to ratification of the Comprehensive Test Ban Treaty. This study analyzed issues that had been raised in the U.S. Senate's truncated debate and vote against ratifying the treaty in the fall of 1999. The committee, which included three former national laboratory directors and three other former nuclear weapon designers, concluded that many of the technical concerns raised were unfounded. Its report informed Gen. Shalikashvili's report to the President endorsing the proposition that ratification of the treaty would be in the security interest of the United States. The panel's full report will be published in unclassified form with a classified appendix in the fall of 2001.

South Asia. Despite the continued nuclear standoff in South Asia, the Bush administration appears to be intensifying the U.S. tilt toward India that it inherited from the Clinton administration. Many observers predict that President Bush will waive some or all of the remaining post-test U.S. sanctions on India as a move toward building a strategic partnership that de-emphasizes nuclear weapons issues. Critics argue that putting the nonproliferation issue the back burner under-estimates the threat to regional stability and global security posed by an incipient nuclear arms race in South Asia.

In 2000-2001, MTA fellow Samina Ahmed published a series of articles and reports that highlighted continuing nuclear dangers in South Asia and outlined a regional policy that combines targeted incentives and sanctions on both India and Pakistan. In a briefing paper co-published in March 2001 with the Fourth Freedom Forum and Notre Dame University, Ahmed argued that the Bush administration should condition removal of certain sanctions on demonstrated progress toward nonproliferation objectives. The report's findings were widely disseminated at a number of conferences, seminars, and workshops in Washington, DC and elsewhere, and Ahmed briefed Defense and State Department officials and congressional staffers on its recommendations.

Ahmed's ongoing research includes an examination of the internal dynamics of nuclear crisis stability in South Asia – a major concern for policy makers who must weigh the ongoing risk of escalation between India and Pakistan as they shape policies toward both countries. She has analyzed the linkages between domestic politics and regional conflict in South Asia in several recent papers, book chapters, and seminar presentations. Ahmed concludes that most policy prescriptive analyses underestimate the dangers posed by nuclear crisis instability in South Asia, in particular by emphasizing the technical aspects of South Asian nuclear relations (e.g., what degree of physical control each country has over its nuclear weapons and what steps would be required to launch a nuclear attack). Rather, her research indicates that domestic factors such as changes of government play major roles in shaping nuclear crisis stability in the region.

MTA senior fellow A. Gopalakrishnan, former head of India's nuclear regulatory agency, is examining the current status and future prospects of India's civilian nuclear power industry. This subject is of concern for several reasons. First, major safety concerns have been raised in recent years over Indian nuclear facilities (many by Gopalakrishnan himself). Second, India's civilian nuclear industry has been isolated from international contacts since India conducted its first nuclear test in 1974, so its progress is an indicator of the strength of India's indigenous research and development efforts. On safety, Gopalakrishnan's research indicates that a number of problems have been corrected, although some serious problems persist, mainly because the Department of Atomic Energy is running several old reactors to generate cheap electric power. Regarding the strength of the industry, Gopalakrishnan predicts that the future growth of India's nuclear power program will be mainly limited by available funding, rather than public resistance or availability of technology and spare parts, and that India could more than double its installed capacity over the coming decade (nuclear energy currently provides only about 3 percent of India's electric power, but the government has long planned for major growth, including the development of breeder reactors). This situation indicates that, contrary to some policy recommendations, western offers of nuclear assistance are likely to be ineffective in persuading India to take disarmament steps such as signing the Comprehensive Test Ban Treaty or ending production of fissile material for weapons.

Proliferation and safeguards. If nuclear power is to be expanded significantly in coming decades to address rising energy demand and the need for carbon-free energy sources, the nuclear nonproliferation regime will have to grow commensurately. One key priority for improvement is verification, especially detecting activities that nations do not want to disclose to outside monitors. MTA fellow Hui Zhang has published a series of articles over the past two years on the applications for arms control of newly available commercial satellite photography.

In July 2000, Zhang presented papers on using satellite imagery to monitor nuclear proliferation to the annual meetings of the Institute for Nuclear Materials Management (INMM) and the American Chemical Society. Zhang and Frank von Hippel of Princeton University published an article on monitoring the operating status of nuclear material production facilities in the *Bulletin of the Atomic Scientists* in mid-2001 (following a series of earlier articles in *Science and Global Security*), and Zhang and Matthew Bunn recently completed a joint paper on detecting undeclared nuclear material production facilities which is expected to be published in the fall of 2001. Zhang also wrote an article for *HIMAL South Asia* on possibilities for satellite verification of nonproliferation agreements in South Asia. In 2001, Zhang again presented a paper to the INMM, on ways in which advances in satellite imagery could be expected to increase global transparency and commensurate steps that China could take to increase transparency at its nuclear facilities.

Building the Field. Nuclear security issues are receiving front-page coverage and high-level government attention in the United States, but the community of policy analysts who can assess these problems in depth and communicate their findings to decision makers in a timely way is far smaller today than it was twenty years ago (when in some respects, the issues and choices were more clearly defined and limited). There is a continuing need to train people to carry out multi-disciplinary analysis of nuclear policy questions central to U.S. national security and international nonproliferation objectives, both to maintain expertise in government agencies and to foster a community of non-government experts who can provide independent analysis of official policies. Such mentoring of new generations has been a core mission of the Belfer Center since its founding. In July 2000, John Holdren, Matthew Bunn, former MTA fellow Allison Macfarlane, and participated in a workshop organized by the MacArthur Foundation that examined issues and challenges associated with training scientists to analyze international security and arms control issues. Participants agreed on the value of fellowships such as those offered by MTA and BCSIA, and identified a number of steps to attract and retain technically-trained analysts to this crucial area.

In this vein, MTA pre-doctoral fellow Nathan Busch completed his Ph.D. dissertation, *Assessing the Optimism-Pessimism Debate: Nuclear Proliferation, Nuclear Risks, and Theories of State Action* (University of Toronto). Busch's research examines risks associated with the proliferation of nuclear weapons, such as inadequate command-and-control mechanisms in new nuclear weapons states, to develop an empirical refutation of the "proliferation optimist" perspective held by some analysts that acquisition of nuclear weapons will stabilize regional conflicts by reducing incentives to go to war. He will defend his dissertation in August 2001 and then join the Center for International Trade and Security at the University of Georgia as a senior research associate.

Linkages Between Nuclear Power and Nuclear Proliferation

Nuclear energy's inherently dual-use nature has posed a continuous challenge since its earliest days: how to realize the benefits of peaceful nuclear activities without promoting the spread of nuclear weapons. In the 2000-2001 academic year, *Managing the Atom* focused on the specific issue of reprocessing and use of separated plutonium – which now produces tens of tons of weapons-usable plutonium each year in the civilian sector worldwide – as well as on broader issues of improving the proliferation-resistance of nuclear energy. These are also key issues for

the future of nuclear energy in general; Managing the Atom's other work on that subject is described in more detail below.

Reprocessing and its alternatives. In 2000-2001, Managing the Atom participants continued to make the case against reprocessing of spent nuclear fuel and for alternatives. Matthew Bunn, Steve Fetter, and John P. Holdren are completing a major study, *The Economics of Reprocessing vs. Direct Disposal of Spent Nuclear Fuel*, which explores the issue in detail and demonstrates that uranium prices would have to rise to more than 10 times their current levels – an event not likely to occur in this century, even with rapid nuclear growth – for reprocessing with current technologies to be economic. New technologies would have to reduce the cost of reprocessing manyfold – also extremely unlikely – for reprocessing to be competitive at uranium prices resembling those projected for the next few decades. The report also makes the case that the economics of plutonium “breeder” reactors and of transmutation systems designed to burn up all the plutonium and other long-lived isotopes are likely to be worse still. In addition, the study analyzes in detail a range of recent industry-backed reports that have attempted to portray reprocessing as economic or nearly so, and shows how assumptions in these studies differ from market realities. This report is expected to be published in late 2001.

In July 2000, John Holdren highlighted many of these issues in a banquet address to a Los Alamos National Laboratory/American Nuclear Society conference on “Plutonium Futures – the Science.” Holdren argued that reprocessing and recycling nuclear materials increased the cost and proliferation potential of nuclear energy and did not reduce the waste management burden, at a time when nuclear advocates should be seeking to make nuclear power safer, more economical, and more publicly acceptable.

The best immediately available alternative to reprocessing is interim storage of spent nuclear fuel, in pools or dry casks. If it were politically possible to expand dry cask storage capacity in Japan and other countries, much of the wind would likely go out of their ambitious reprocessing plans. Hence, working with the Project on Socio-technics of Nuclear Energy at the University of Tokyo, Managing the Atom participants produced a major new report, *Interim Storage of Spent Nuclear Fuel: A Safe, Flexible, and Cost-Effective Near-Term Approach to Spent Fuel Management*, which made the case that a large fraction of the world's spent fuel should simply be stored while more permanent options are developed – and that choices of whether to reprocess or not should be driven by careful consideration of economic, security, and environmental factors, not by ideology or the momentum of past contracts and investments. (This report is described in more detail below, in the discussion of Managing the Atom's work on the future of nuclear energy.)

In connection with this study, Managing the Atom participants John P. Holdren, Steven Miller, Matthew Bunn, and Allison Macfarlane traveled to Japan in July, 2000. In public meetings in Tokyo and in Tokai (home of Japan's only operating reprocessing plant, and site of a recent nuclear accident that killed two workers and forced a large-scale evacuation), they made the case for simply storing spent fuel, outlined the arguments against near-term reprocessing of plutonium, and highlighted the need for much more stringent measures to limit nuclear energy's contribution to the risk of nuclear proliferation. Each of these meetings attracted 100 or more participants, including a broad cross-section of the Japanese press and nuclear industry officials.

During calendar year 2001, MTA is hosting a post-doctoral research fellow, Shigekazu Matsuura, on leave from Japan's Ministry of Education, Culture, Sports, Science, and Technology (MEXT). From 1995-2000, Matsuura worked on atomic energy and nuclear fuel issue for Japan's Science and Technology Agency, which became part of MEXT in an administrative reorganization in 2001. His work at BCSIA focuses on the economic and non-proliferation aspects of Japan's reprocessing program.

China is also nearing major decisions about whether to embark on a large-scale civilian reprocessing program. In 2000-2001, MTA post-doctoral fellow Hui Zhang carried out a detailed analysis of China's options, demonstrating that for China as well, dry cask storage for several decades would be cheaper, safer, more secure, and cause less environmental damage than reprocessing. Zhang presented a paper on the pros and cons of reprocessing for China to the 2001 meeting of the Institute for Nuclear Materials Management, and is completing an MTA working paper on China's reprocessing policy.

Reducing the proliferation risks of nuclear energy. Throughout the past year, international discussions of future nuclear energy systems focused increasingly on "proliferation-resistance," with considerable debate over what systems could be considered more proliferation-resistant than others and how this attribute might be judged. Matthew Bunn served on a panel on Technological Opportunities for Proliferation-Resistant Systems (TOPS) of the Department of Energy's Nuclear Energy Research Advisory Committee. The panel's report, released in January, 2001, explored a wide range of possible future systems that might be more proliferation-resistant than existing technologies, presented a preliminary approach to analyzing the proliferation attributes of different systems, and recommended a proliferation-resistance research agenda to be funded at roughly \$25 million a year.

In a September 2000 speech at the United Nations Millennium Summit, Russian President Vladimir Putin called for a major international effort to develop proliferation-resistant nuclear energy systems that would not involve either separated plutonium or enriched uranium. This specific proposal was designed to promote a particular liquid-lead-cooled breeder reactor concept advocated by then-Minister of Atomic Energy Evgeniy Adamov, but MTA participants worked to make the case that the U.S. government should respond by agreeing that controlling plutonium and HEU was crucially important, and proposing a major acceleration of joint U.S.-Russian efforts to secure, monitor, and reduce stockpiles of these materials, combined with a modest joint R&D effort on proliferation-resistant nuclear energy systems. Unfortunately, bureaucratic opponents within the U.S. government (concerned over Adamov's lead-cooled breeder concept and Russia's nuclear cooperation with Iran) succeeded in blocking such a response, as well as U.S. participation in the International Atomic Energy Agency's (IAEA) International Project on Innovative Reactors and Fuel Cycles (INPRO) initiative.

Managing the Atom participants also explored the past role of civilian nuclear energy as a source of technology, trained personnel, and legitimizing cover for nuclear weapons programs around the world, and concluded that the majority of all known cases of serious nuclear weapons programs included at least some significant contribution from the civilian sector. Matthew Bunn wrote a paper analyzing this history which was presented by Wilhelm Gmelin, the former chief

of EURATOM's safeguards directorate, at an IAEA-sponsored international conference on proliferation and nuclear energy in Como, Italy. During the July, 2000 Tokyo trip mentioned earlier, Managing the Atom co-principal investigator Steven Miller gave a speech to senior nuclear energy officials in which he outlined this history and made the case that without fundamental changes in the institutional and technical approaches to nuclear energy, a large-scale expansion of nuclear power to cope with the challenge of climate change could result in unacceptable threats to international security.

Safeguards and security. Over the past year, Matthew Bunn pursued a research project on the history, present status, and technologies of selected aspects of nuclear safeguards, examining options for strengthening them. This work is expected to lead to a paper on safeguards for large reprocessing plants – the most sensitive and difficult-to-safeguard facilities in the nuclear fuel cycle – in late 2001 or early 2002. Bunn and post-doctoral fellow Hui Zhang will both give presentations at the IAEA's International Safeguards Symposium in the fall of 2001 on approaches to strengthening safeguards and security for nuclear materials.

Assessing the Future of Nuclear Power

Assessing the future of nuclear energy - including the potential for, and constraints on, a significant nuclear contribution to dealing with climate change – remains a central focus of the Managing the Atom project. Rising world energy demand and growing support for action to reduce greenhouse gas emissions have spurred debate over the appropriate role for nuclear power. Advocates argue that it is the only mature energy technology that can be expanded rapidly enough to substitute in the near term for fossil fuels, while opponents contend that it has too many drawbacks to serve as even a partial or stopgap tool for meeting future energy needs. Managing the Atom begins from the premise that nuclear power is an option for meeting future energy demand and reducing greenhouse gas emissions, but that it is unlikely that to achieve the major growth needed to provide a significant fraction of the world's carbon-free energy requirements in the 21st century unless the proliferation, safety, waste management, and cost issues that have limited past government, utility, and public acceptance of nuclear power are satisfactorily addressed.

In September, 2000, the United Nations published its *World Energy Assessment*, analyzing the status and future of energy systems worldwide. Matthew Bunn served as a contributing author for the chapter on the future of nuclear and fossil energy, which made the case that nuclear energy could only be a substantial contributor to dealing with greenhouse gas emissions if it were made substantially cheaper, safer, and more proliferation-resistant – and managed in a more democratic fashion, putting a well-informed public in a position to ensure that its concerns were effectively addressed.

Also in July, John Holdren testified before the House Science Committee's Subcommittee on Energy and Environment on the potential role of nuclear power in improving U.S. energy security and reducing greenhouse-gas emissions. Holdren outlined the significant waste management, safety, proliferation, cost, and public acceptability improvements that would be needed for nuclear power to play a significant role in coming decades, and recommended moderate R&D investments to see whether such advances were feasible and practicable. Holdren also discussed this agenda in a keynote speech to the annual meeting of the National

Academy of Engineering in February 2001. In May, MTA director Jennifer Weeks wrote a shorter version of these recommendations for the *Washington Post's* weekly Sunday opinion section just before the release of the Bush administration's energy plan.

Waste management. One of MTA's most significant products in 2000-2001 was a book-length report, *Interim Storage of Spent Nuclear Fuel: A Safe, Flexible, and Cost-Effective Near-Term Approach to Spent Fuel Management*, written jointly with the Project on Socio-technics of Nuclear Energy at the University of Tokyo. With both reprocessing plans and geologic repositories around the world encountering major delays, spent fuel pools around the world are filling up (more than 150,000 tons of spent fuel is now in storage). Inadequate capacity for spent fuel storage is raising the risk that some reactors may be forced to shut down, and critics of new reactors around the world are pointing to the lack of a path forward for nuclear waste as a key argument against nuclear expansion.

The new report argued that the best approach for much of the world's spent fuel is to store it for several decades while better permanent solutions are developed, and that technology is readily available to store this dangerous material safely, cheaply, and securely for many decades. The report analyzes the technological, economic, safety, and security issues posed by spent fuel storage; outlines the current status of storage in the United States, Japan, and other countries; describes the tortured political history of spent fuel management in the United States and Japan; analyzes the pros and cons of international sites for storage or disposal of spent fuel from many countries, including Russia's proposal to import foreign spent fuel; and recommends a new, more democratic, more flexible, and more transparent process for siting interim storage facilities, designed to increase the chances of gaining public support.

The report's entire contents were posted on the Managing the Atom website. An e-mail to nearly 1000 nuclear experts worldwide alerted them to the report's availability, and pamphlets on the report were distributed at the Carnegie International Nonproliferation Conference in June, 2001, and the 2001 meeting of the Institute of Nuclear Materials Management in July, 2001. The report's conclusions were reported in several Japanese newspapers, and in the U.S. trade press.

The longer-term issue of developing geologic repositories that can isolate spent nuclear fuel and radioactive waste for tens of thousands of years looms large on the agenda, with the Department of Energy scheduled to decide whether it will apply for a license to build a repository at Yucca Mountain, Nevada in the fall of 2001. Former MTA fellow Allison Macfarlane (now a senior research associate with MIT's Security Studies Program and a non-resident MTA affiliate) is scheduled to publish several articles on interim and long-term handling of nuclear waste in 2001 based on her work at BCSIA from 1998-2000. Macfarlane's forthcoming publications include articles in *Energy Policy* and *Annual Review of Energy and the Environment*, along with an edited volume to be published by MIT Press on unresolved scientific questions that may potentially affect the safety of a repository at Yucca Mountain.

NUCLEAR DECISION-MAKING

Managing the Atom's second large area of concentration is the problem of democratic management of nuclear decisions. Nuclear policy issues involve complex technical judgments

and risks that are difficult to quantify. Much of the information required for fully informed public debate is restricted on either national security or proprietary grounds. In many countries, nuclear decisions are the purview of a few agencies that allow little if any opportunity for participation by outside parties. All of these conditions reinforce the pervasive mistrust of nuclear technology that characterizes public opinion in many countries. Under these conditions, it is difficult to build consensus even in support of urgent priorities, such as actions to manage nuclear waste safely.

Public participation

MTA's report on interim storage of spent nuclear fuel, described above, includes a detailed discussion of approaches to public participation in considering potential sites for interim spent fuel storage facilities. It recommends a number of steps to build transparency and democratic participation, based on a "Facility Siting Credo" recently developed by U.S. public policy scholars, and provides examples from around the world in which each of the recommended steps has actually been applied. Such an approach is likely to be crucial if current efforts to overcome the political obstacles to building a large centralized spent fuel storage facility in Japan are to be overcome. The case of Finland's nuclear waste program is particularly notable: during the 2000-2001 year, Finland became the only country in the world to succeed in choosing a site for a permanent nuclear waste repository with the complete support of the local community. Indeed, two communities were competing for the facility, and the losing community complained.

MTA fellow Darryl Farber's work at BCSIA has focused on public involvement in issues associated with decommissioning nuclear power reactors. In July 2001, Farber and MTA director Jennifer Weeks published a cover article in *Environment* outlining policy concerns associated with decommissioning, with recommendations for improving the regulatory framework in ways that would promote better risk communication and increase public involvement in the process. The article discussed several U.S. sites where decommissioning had become highly controversial because of poor communication and local concerns that work was not being conducted in ways that minimized environmental, safety and health risks.

Farber met several times during the year with officials at the Nuclear Regulatory Commission (NRC) to discuss ways in which the Commission could increase the transparency of its decision-making for stakeholders on issues such as the probability of certain types of accidents at nuclear reactors. Farber also was interviewed by investigators from the General Accounting Office conducting an assessment of NRC's risk communication activities and other efforts to increase public involvement in NRC decisions. Farber is completing a working paper on ways in which the NRC can increase learning on the part of all parties in its regulatory processes.

IV. SCIENCE AND TECHNOLOGY POLICY FOR COMPETITIVENESS, SUSTAINABILITY, AND SECURITY

Science and technology permeate virtually every aspect of modern life. When government policies designed to promote scientific and technological innovation succeed – as in the case of the U.S. aerospace industry, to take but one prominent example – the result can be dramatic economic gains, major environmental improvements, or dramatic improvements in military capabilities. Indeed, economic growth in the developed world now comes primarily from

technological change. Where public science and technology policies fail – as in the case of the U.S. effort to develop synthetic fuels in the 1970s, for example – the result can be the waste of billions of dollars, or the inability to achieve economic, environmental, or security goals. Many fast-moving new areas of science and technology – such as biotechnology, a significant focus of STPP research and policy outreach during 2000-2001 – require balancing uncertain potential benefits against uncertain potential risks, judged from a wide variety of perspectives. Hence the question of how government can best foster the innovation needed for economic competitiveness, sustainability, and security is a critical one, and it continued to be a central focus of STPP’s work in the 2000–2001 year.

A key project during the 2000-2001 academic year was the initiative on “Basic Research in the Service of Public Objectives.” The project was initiated in 1999 after a discussion with the President’s Science Advisor, Dr. Neal Lane, and the five Harvard principals – STPP directors emeritus Lewis Branscomb (principal investigator) and Harvey Brooks; Gerald Holton and Gerhard Sonnert of the Harvard Physics Department; and Paula Rayman of the Radcliffe Institute. STPP fellow Stephen Feinson is the project director, with these five as the steering committee.

The completion of the first phase of the project is embodied in a report that we believe offers a very attractive and in many ways new approach to the justification for federal financing of basic scientific research. The report, entitled *Science for Society: Cutting-Edge Basic Research in the Service of Public Objectives* and published by STPP, is the product of a two-year initiative involving scientists, congressional and agency staff, and politicians, and calls for a broad-based effort to revitalize federal science policy. It urges the linking of *basic science* – the historical engine for the US’s tremendous economic, medical and technological advances – with vital areas of public interest.

The initiative included a national conference in November 2000, at which National Science Foundation Director Rita Colwell argued that “broad-based support of science and technology will only be achieved if the public truly understands the value of science and engineering to twenty-first century society...today’s discussion, among scientists, educators, policy makers, industrialists and legislators, is an important step towards unifying public support for research and securing a better future for all.” Conference speakers included, in addition to Dr. Colwell, NCI Director Richard Klausner, former Science Advisors to the President D. Allan Bromley, Jack Gibbons, and Guyford Stever, as well as David Hamburg, Mary Good, MRC Greenwood and Leon Lederman.

In the face of increasing competition for resources, both Democrats and Republicans joined in the recent budget debates in Congress to express strong support for the nation’s science endeavors, while recognizing the need to present a consistent, overarching rationale to citizens and policymakers for such research. The report stresses the need for a national conversation that engages stakeholders at all levels of the process, as well as comprehensive analysis of current and potential models for the funding of scientific research. The initiative has used the term of Jeffersonian Science, a name coined by one of the report’s authors, Professor Gerald Holton, to capture the dual-purpose style of research being proposed. As Holton stated, this approach seeks

to “increase the federal investments in selected areas of basic scientific ignorance, where understanding may open new opportunities for society to address its most important concerns.”

The release of the report coincides with the transfer of the project to the Washington, DC, based Center for Science, Policy, and Outcomes (CSPO), a center established by Columbia University dedicated to understanding the linkages between S&T and its effects on society. Steven Feinson, the project director of the Harvard project, has moved to CSPO and will continue to run the project under the co-PI direction of Lewis Branscomb and Dan Sarewitz of CSPO. It is our hope that this collaboration will enable the initiative to become the catalyst for a national dialogue on the future of U.S. science policy. This entails not only widely distributing the project report, “Science for Society,” to the public, policy makers and scientists, but also developing an interactive website (we have already secured the scienceforsociety.org URL) which would further the ongoing dialogue surrounding the initiative. Future activities under the Project include expanding and deepening the national dialogue, a broader examination of the themes of basic research in the service of public objectives, and a full exploration of test cases in areas such as education, energy, and global climate change. We are also planning a series of informal dinner discussions with key policy makers and scientists in order to further expand the discussion, as well as a panel at the February 2002 AAAS Annual Meeting in Boston.

It is clear from the success of the November conference, and the subsequent responses from policy and science circles to the report, that we have embarked on a project that holds great promise for crafting a US science policy that firmly links basic science research with critical national objectives.

The project on Basic Research in the Service of Public Objectives is made possible with generous support from the David and Lucile Packard Foundation and the Alfred P. Sloan Foundation.

During 2000-2001 Branscomb also continued to lead STPP’s efforts related to how government can best foster innovation in the private sector. The focus of much of this work during 2000-2001 was a project called “Between Invention and Innovation.” The first phase of this project resulted in the publication of the groundbreaking book *Taking Technical Risks: How Innovators, Executives, and Investors Manage High Tech Risks* (MIT Press, 2001), by Branscomb and STPP fellow Philip E. Auerwald, praised by MIT President Charles Vest as moving “beyond shibboleths about winners and losers...worthwhile reading for policymakers, corporate leaders, and academicians.” The book assesses how the various participants in the innovation process, from invention to the marketplace, manage the risks they face, and what role government may have in reducing these risks to promote technological competitiveness.

The second phase of the project, pursued during the 2000-2001 academic year, focuses on a related set of questions about the innovation system. Investments in basic and applied research support the development of both science-based inventions and entrepreneurial talent—the dual prerequisites for commercial innovation. Corporate and venture capital investors are effective in exploiting scientific and technological advances when such advances are embodied in new products and services whose specifications and costs match well-defined market opportunities. However, this conversion of inventions into commercial innovations is a process fraught with obstacles and risks. Despite the apparent abundance of funds available for the marketing of

readily commercializable technologies, many technologists, investors, and public and private sector decision-makers argue that significant institutional and behavioral barriers continue to make it difficult for new technologies to cross the “funding gap” between the first invention of a new idea and a product ready for the marketplace.

The purpose of this study is to inform public policy with regard to technology-based innovation through a comprehensive analysis of investments into early stage high technology ventures. The inquiry is organized around two sets of questions:

- What specific difficulties do firms face when attempting to find funding for early-stage, high-risk R&D projects? How do these difficulties vary by firm size? By industry? By geography? By source of funding? By origin of the firm? To what extent are such difficulties due to structural barriers or market failures?
- What institutions are funding research in this gap? How does the distribution of funding for early stage, technology based innovations vary across industries? By geographical region? By firm size?

The emphasis in this study is on inputs into the innovation process, rather than outputs or outcomes. Clearly, from a public policy perspective, inputs are only interesting to the extent that they relate to socially desired outcomes. However, before one can begin to discuss the relationship of inputs to outcomes, one must first arrive at a coherent picture of the process, the institutional participants, and the basic definitions that allow for comparison of roles and contributions. The objective of the project is not to offer conclusive results regarding the *appropriate* distribution of inputs; rather, it is to suggest some underlying parameters and definitions to set the context for both debate over public policy and future academic research.

The project is being carried out by an STPP team including Philip E. Auerswald, Lewis M. Branscomb, Thomas Livesey, and Ambuj Sagar. It is funded by the Advanced Technology Program (ATP) of the U.S. Department of Commerce.

In addition, Associate Professor David Hart continued his work in the area of technology and competitiveness policy in the 2000-2001. He organized a major national conference on entrepreneurship and public policy under the sponsorship of the National Commission on Entrepreneurship and the Ewing Marion Kauffman Foundation in April, 2001. Speakers at the conference included Michigan Governor John Engler, U.S. Senator Tom Carper, and U.S. Representatives Ed Markey and Harold Ford, Jr. This conference is expected to lead to an edited volume, tentatively titled *The Emergence of Entrepreneurship Policy* in the coming year.

Philip Auerswald also worked with the Commonwealth of Massachusetts’ Department of Economic Development (DED) on the initial stage of a comprehensive study of the Massachusetts economy, with particular emphasis on the role of technological innovation and the challenges presented by dynamic economic change. Auerswald is the principal author of *Competitive Imperatives for the Commonwealth: A Conceptual Framework to Guide the Design of State Economic Strategy*, soon to be released by the DED.

In March, 2001, Auerswald was an invited participant in a Senate Committee on Small Business Forum on “Encouraging and Expanding Entrepreneurship: Examining the Federal Role,” submitting testimony for the record jointly with Lewis Branscomb. In June, Auerswald presented a paper entitled “The Complexity of Production, Technological Volatility and Inter-Industry Differences in the Persistence of Profits Above the Norm,” at the 3rd international meeting of the Society for Computational Economics at Yale University. Since 1995, Auerswald has also been the editor of the *Foreign Policy Bulletin*, the successor publication to the *Department of State Bulletin*, published by Kluwer Law International. He is the co-editor (with David Auerswald) of *The Kosovo Conflict: A Diplomatic History Through Documents*, published in July 2001 with a foreword by Sen. Joseph Biden Jr.. As editor of the *FPB* he is currently working on a book-length compilation of documents chronicling international diplomatic efforts to combat global warming.

V. SCIENCE AND TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT

Through its partnership with the Center for International Development, STPP’s project on “Science and Technology for Sustainable Development” continued to focus on the role of biotechnology in the global economy. The project, directed by Calestous Juma, undertakes policy research, training and outreach with particular emphasis on developing countries.

The project examines recent trends in globalization and their implications for the use of science and technology in the developing world. It focuses on how to mobilize the world’s pool of scientific and technological knowledge to contribute to sustainable development. The key emphasis in recent years has been on science and technology policy issues related to biotechnology and globalization, and biological diversity in developing countries.

The project runs a non-credit seminar on global governance of science and technology which is attended by students, faculty and visiting fellows from Harvard University, MIT, and Tufts University. The previous seminar series focused on biotechnology and was attended by participants from Asia, Africa, Latin America, North America and Europe.

The project has established a fellowship program to support science and technology policy makers and researchers from developing countries. The aim of the fellowships is to equip policy makers and analysts with the skills needed to integrate science and technology issues into national decision-making. The need for capacity building in this area has been prompted by the growing recognition of the role of science and technology in addressing development challenges under conditions of globalization.

The project has convened a number of conferences and seminars on issues such as the precautionary principle, with participants from around the world. It also maintains a web-based viewpoints page, with short contributions that are also e-mailed to hundreds of participants worldwide. So far over 140 viewpoints have been posted to our web site. The lively discussion of ideas that has taken place through these contributions has been widely reported on various academic list-serves devoted to biotechnology issues, and has helped to shape both the preparation for our September conference and the follow-up research activities.

Juma is a member of the National Research Council's Board of Agriculture and Natural Resources and the NRC Standing Committee on Biotechnology. He regularly provides advice to various agencies of the United Nations system as well as members of the diplomatic community. He served as a principal consultant for the United Nations Development Programme's *Human Development Report 2001*.

The Science and Technology for Sustainable Development project at STPP is made possible through generous support from the Rockefeller Foundation.

V. SCIENCE AND TECHNOLOGY POLICY PROCESSES

The *ways* decisions get made often have an enormous effect on *what* decisions get made: hence, STPP has maintained its long-standing interest in the processes for science and technology policy decision making. A substantial part of STPP's work in this area is "researching by doing," through the participation by key STPP personnel such as Holdren, Branscomb, Brooks, Jasanoff, Juma, Hurley, and others in a variety of national and international advisory or decision-making panels on particular aspects of science and technology policy.

In addition, Associate Professor David M. Hart's ongoing research focused on the political development of the U.S. high-technology industry and on the history of the interface between technological innovation, business, and government. Work on the first theme resulted in two book chapters, an article in the *Journal of Politics*, and a panel at the Midwest Political Science Association annual meeting as well as several papers currently in progress. This project is expected to result in a single-authored book that will trace the ways that U.S. high-technology companies have identified and represented their interests in Washington, D.C. since 1970. On the second theme, Hart hosted a small conference on U.S. business history, associated with a volume forthcoming from Oxford University Press, and published an article on antitrust and technological innovation in *Research Policy*. In addition, Hart published (with Lewis M. Branscomb) an analysis of the implications of the U.S. presidential election for science and technology policy in *Nature*. Hart served as a consultant to the National Research Council's panel on Government Performance and Results Act.

STPP director emeritus Lewis Branscomb, meanwhile, was principal investigator for the Interfaculty Working Group on Diversity in Science and Technology, funded by a grant from the Harvard Provost. This was a Harvard-wide initiative to explore issues of diversity, both in terms of gender and of race/ethnicity, within the fields of science and technology. The project included three working dinner meetings, held during the Spring 2001 semester, with students, senior faculty members and select outside experts. The two broad questions addressed were "How can a more diverse science community be achieved?" and "How might science, and the national priorities that motivate political support for scientific research, be different if we had a more diverse scientific community?" The purpose of the project was to engage science students, both undergraduate and graduate, and senior faculty in a thoughtful discussion to explore these questions, and to provide insight into the views and motivations of those currently entering or considering entering the field of science and technology. The discussion focused both on the potential impact of greater human diversity among scientists on the process and products of scientific research, and on the broad issues of identifying appropriate priorities for research

investment, education reform, reversing the decline of student interest in science, and of the engagement of more women, minorities and handicapped persons in science – in short the balance of human resources required for a truly healthy scientific enterprise. Student and faculty contributions, both prior to and during the meetings, comprised the Working Group’s final report to the Provost. STPP fellow Stephen Feinson coordinated the activities of the group and co-authored the final report.

VI. LEGAL, POLITICAL, AND CULTURAL STUDIES OF SCIENCE AND TECHNOLOGY

Science and technology have far-ranging effects on society—on culture, values, the distribution of wealth and power, and democratic governance—and these factors, in turn, help shape the course of scientific and technological change. The project on Legal, Political, and Cultural Studies of Science and Technology (abbreviated as “the STS Program”) is an ongoing research, teaching, and training endeavor, led by Professor Sheila Jasanoff, which sets out to explore these critical issues.

RESEARCH AND TRAINING

Project Leader

In 2000-2001, Sheila Jasanoff’s research focused, as always, on science, technology, politics, and law in three arenas: U.S. S&T and environmental policies; comparisons between the U.S. and Europe; and international S&T policy issues, especially concerning the environment. Under the first heading, she researched and wrote papers on the implications of the new evidence decisions handed down by the Supreme Court in the 1990s. Her comparative research centered on the regulation of biotechnology in the US and Europe, with specific attention to the emergence of new bioethics principles and scientific advisory institutions, as well as new modes of public participation in technically complex decisions. She continued her research on the controversies over genetically modified crops and mad cow disease; she also managed a project comparing the credibility of expert advice in air pollution and biotechnology standard-setting in the US and the European Union. At the global or transnational level, she developed her theoretical interest in the relationship between global and local knowledge systems. In addition, she continued a project on the role of global science bodies such as the Intergovernmental Panel on Climate Change (IPCC) in framing environmental problems, and the implications of these processes for sovereignty and governance.

Jasanoff completed her work as Section Editor for Science and Technology Studies of the *International Encyclopedia of the Social and Behavioral Sciences*, and continued to serve on the editorial advisory boards of *Global Environmental Politics*; *International Studies Review*; *Science and Engineering Ethics*; *Social Studies of Science*; *Science, Technology, and Human Values*; *Science Communication*; and the MIT Press series on “Science, Politics and Environment.” As president of the Society for Social Studies of Science (4S), Jasanoff was responsible for organizing the 4S annual meeting to be held in Cambridge in November 2001, as well as a related workshop on undergraduate education entitled *Beyond the Two Cultures: STS and the Liberal Arts* (for which she obtained funding from the National Science Foundation (NSF)). (See attached personal reports for further details of her teaching, presentations, and

public activities in 2000-2001.)

Training Activities

The STS Program broadly engages in the training of young scholars and professionals who wish to deepen their understanding of the relationship between science, technology, politics and society. To this end, it periodically hosts visiting scholars from the US other countries. In 2000-2001, three junior scholars and two senior scholars visited the Kennedy School for periods of three months to a whole semester. The junior scholars were Claus Reinhardt (State Institute of Education, Karlsruhe, Germany), Tiago Santo Pereira (Fulbright Fellow, Portugal), and Patrick Verkooijen (Netherlands Environment Ministry). The senior scholars were Dr. Rob Hagendijk (University of Amsterdam) and Professor Stephen Hilgartner (Cornell University), who co-organized with Jasanoff a workshop on the Election 2000 controversy.

Besides the courses, workshops, colloquia, and other events sponsored by the STS Program, academic training for fellows is offered through a weekly advanced research seminar, entitled the "Science Studies Research Seminar (SSRS)." About 15 SSRS participants met throughout the year to present their ongoing research before a friendly, yet sophisticated, group of international scholars and critics. The presentations were based in some instances on pre-dissertation research and in others on work in progress leading to invited lectures, articles, books, or extended research projects. This successful experiment may well mark a first of its kind in the field of science and technology studies through its bridging of theory and practice, pre- and postdoctoral research, and U.S. as well as international scholarship. The seminar also bridged disciplines, drawing participants from STS, environmental studies, history of science, law, and policy studies.

Reframing Rights: Constitutional Implications of Technological Change

In collaboration with Fred Schauer, Academic Dean of the Kennedy School, Jasanoff continued to explore the constitutional issues raised by new developments in science and technology. One output of the grant was a new course, "Law and the Life Sciences," developed and taught by Jasanoff at the Kennedy School in spring 2001. In addition, the training program, funded by a three-year training grant from the National Science Foundation, supported four fellows during the year: Robert Doubleday, Jennifer Reardon, Mariachiara Tallacchini, and Robert Triendl. Their individual reports follow.

Robert Doubleday

Over the past year, Robert Doubleday developed the framework for his doctoral thesis research, carried out some preliminary research, and established contacts for future research in the United States. His project focuses on the innovation of nutritionally enhanced crops through biotechnology. This provides a case of technological innovation in the context of public controversy over the desirability of particular technological choices and trajectories. The processes of generating scientific knowledge, innovating commercial technologies, and the political regulation of these technologies are closely related, but they offer very different opportunities for public engagement. It is these forms of engagement, and how they relate to notions of democracy and accountability in the US and EU, that Doubleday is exploring through two case studies. One is the work of DuPont to develop healthier soy oil for the food processing industry. The second will be on the work of the European biotech company, Syngenta.

Doubleday participated in the weekly Science Studies Research Seminars, led by Professor Jasanoff, at the Kennedy School of Government, chaired a panel and acted as a rapporteur for the workshop *Owning Up: Bodies, Selves, and the New Genetic Property* on May 4-5, 2001, and was a rapporteur at the NSF-funded workshop *The Machinery of Representation: Voting Technologies and the 200 Presidential Election*, March 16-17, 2001.

Doubleday also, together with fellow Jennifer Reardon and graduate students from Harvard University biology departments, was involved in setting up an informal discussion group for graduate students from across the University on issues of Biology and Society. This group met twice during the year and sought to bridge the gap between the two natural and social sciences and public policy.

Jennifer Reardon

Over the past year, Jennifer Reardon completed research for her dissertation on “Race to the Finish: Identity and Governance in an Age of Genetics.” She successfully defended her dissertation at Cornell University in May 2001. In this work, Reardon explored how scientific research on human genetic diversity shapes and is shaped by struggles over rights and values in society. The final stages of her project included attending scientific meetings on human genetic diversity research at the National Institutes of Health, as well as conducting semi-structured interviews. The Human Genome Diversity Project demonstrates that scientific and technical debates about how to study and interpret human genetic diversity are deeply interwoven with debates over rights and values in society. In particular, Reardon’s research shows that political struggles over the constitution of group membership, and the resulting categories used to order society (such as race and ethnicity), also influence the choices that scientists make about the categories, technologies, and sampling methods they use to order nature. In turn, the products of scientific work (categories, technologies, sampling methods) affect the meaning and constitution of social groups and the rights accorded to these groups.

Reardon’s work highlights the limitations of existing tools in Western biomedical ethics to address the complex questions about rights, identity, and race raised by the Human Genome Diversity Project and other attempts to study human genetic diversity. The doctrine of informed consent, in particular, was developed in Western contexts where the holder of rights and the locus of autonomy are assumed to be the individual. Thus, this ethical construct cannot easily be extended to protect collective rights without creating both major and minor legal, political, and ethical dilemmas. The effort by the Diversity Project’s North American Regional Committee to expand informed consent from individuals to groups demonstrates the problems created by such an extension: groups are by default defined by using technological expert definitions that bypass vital questions about how groups see themselves in the social order, and who is authorized to speak for them. Although sophisticated notions of collective rights have evolved in other contexts, the Diversity Project makes the point that these notions have not as yet been articulated within the field of Western biomedical ethics.

As part of her training program, Reardon acted as rapporteur for the Interfaculty Initiative on Genetics, Biotechnology and Public Policy. She co-organized a workshop with Professor Sheila Jasanoff entitled “Owning Up: Bodies, Selves, and the New Genetic Property” (see below).

Finally, Reardon also helped to organize an informal biology and society group comprised of graduate students and postdoctoral fellows from units at Harvard spanning the biological sciences, the Law School, and the John F. Kennedy School of Government. The group met to discuss issues of joint concern, including media coverage of genetics research and intellectual property in academic science. Another of the group's accomplishments was the creation of an e-mail list to exchange information about events relating to genetics and society across Harvard.

During the year, Reardon made a number of academic presentations, including a presentation on genetics and society to the University of Kansas Honors Program in April 2001; a talk entitled "Mapping Nature/Culture: The Dilemmas of Population Genetics and Liberal Democracy," at the "Mapping Cultures of 20th Century Genetics Workshop," Max Planck Institute for the History of Science, Berlin, Germany, in March 2001; a presentation on race and ethnicity at Tufts University's 2001 Symposium for the Education for Public Inquiry and International Citizenship Program; a commentary at the workshop on "Genomic Futures: Ethical Challenges, Social Choices, and the University," at Cornell University in November, 2000; and a paper entitled "Race and Difference in the Age of Genetics: The Case of the Human Genome Diversity Project," at Brown University in October 2000.

Mariachiara Tallacchini

Over the past academic year, Mariachiara Tallacchini developed a case study on informed consent and public participation in xenotransplantation. To acquire the broad knowledge and skills needed for understanding all aspects of the topic, Tallacchini not only looked through the existent scientific, political, social, ethical and legal literature, but also attended (January - June 2001) the Transplantation Biology Research Centre at Massachusetts General Hospital (director: Dr. David Sachs), where pre-clinical trials on xenotransplantation (transplantation between pigs and baboons) are performed. Activities at MGH included participating in seminars and talks, discussion with scientists, consulting library resources, and attending surgical operations.

With respect to specific links between the "Reframing Rights" project and the project on xenotransplantation, Tallacchini's work on xenotransplantation (provisionally titled "Transgenic Culture and Transboundary Policy In Xenotransplantation") is an attempt to analyze the role of legal frameworks, both in the US and in Europe, in implementing this biomedical technology. Xenotransplantation is an outstanding example of the power of different narratives in shaping the social implementation of a biological technique. Different constructions of xenotransplantation are provided by (1) scientists (mainly concerned with the very basic problem of "fighting rejections" of the alien organ), (2) administrative agencies, such as FDA and NIH in the US, and several committees in the Council of Europe and in the EU (primarily focused on "preventing infections" connected to the risks of xenogenetic epidemics and of social resistances), (3) industry (interested in transforming xenotransplantation techniques into more manageable biopharmaceutical products, and in constructing a "transplantation community" which shares a "transgenic culture"). These in turn provide a kaleidoscopic picture in which new identities (the xenotransplantation donor, the xenotransplantation recipient, the close-contacts), new objects (the xenotransplantation products), and new forms of agency, relationships among different social groups, and procedures emerge (isolation of the recipient, procedures of education of the recipient and the public).

All these new situations are unlikely to fit in the existing conceptual and discursive framework of rights, and many paradoxes and inconsistencies flow from the encounter of these unprecedented contexts with traditional legal warrants and procedures. In the above described “xenolandscape,” law is used as a tool for legitimizing existing gaps between the scientific and the political construction of xenotransplantation. The different ways in which the US and the European guidelines envision the boundaries between individual and public participation gives rise to a different allocation of risks and different perspectives on the role of the State.

Tallacchini gave two presentations at the Kennedy School. The first was an informal seminar concerning xenotransplantation, entitled “Xenogenesis: Transgenic Culture and Transboundary Policy in Xenotransplantation.” This talk was an analysis of the role of legal frameworks, both in the US and in Europe, in implementing xenotransplantation into medical science. Tallacchini was also a panelist at the workshop *Owning Up: Bodies, Selves, and the New Genetic Property*, May 4-5, 2001 at Harvard University. Her talk, “The Rhetoric of Anonymity and the Ownership of Human Biological Materials (HBMs),” dealt with the legal regulation of human biological materials as far as their informational content is concerned. It showed that the concept of anonymity/anonymization is applied as a piece of rhetoric in order to legitimize the free availability of HBMs for the research community.

Robert Triendl

Since February, when he became a BCSIA fellow attached to the Reframing Rights project, Robert Triendl's research has worked towards the completion of a dissertation project on the uses of scientific and technical expertise in construction, public health, and biotechnology regulation in Japan. He has largely completed the first part of a broad survey of regulatory approaches with regard to genomics research in Japan, Korea, China, Singapore, Thailand, and Taiwan. To date, there exist only very few studies in any language (including Japanese) on the relationship between science, technology, and government in Japan. This is especially true with regard to research undertaken from a position genuinely informed by perspectives from STS. Despite considerable interest in changing economic policy and "deregulation," there are as yet very few studies that focus on more than one industry or regulatory agency or that analyze the role and uses of technical expertise in policymaking. Through a comparison of case studies in four areas of regulatory policy making that have received considerable attention in Japan over the past few years--construction, chemicals, public health, and biotechnology--Triendl's study aims to make an informative as well as theoretically novel contribution to research on the interface between science, technology, and government.

Triendl also participated in two-day workshop on regulatory issues surrounding the research and therapeutic use of human cells and tissues organized by the group of scientists, administrators, and industry representatives related to the Japanese Society For Cell and Tissue Cultures, and gave talks on regulatory policy with regard to genomics & clinical bioinformatics across Asia at a meeting of the Japanese Chemical & Bioinformatics Society (CBI). At Harvard, he was a regular participant in the Science Studies Research Seminar at BCSIA, in which he gave a presentation of his research.

OUTREACH

The Legal, Political and Cultural Studies of S&T Program has been particularly active in building bridges between the Kennedy School and external institutions, including Harvard University schools and departments, other academic institutions in the region, and actors in the policy world. In 2000-2001, these activities were carried out partly through an interfaculty project funded by the Harvard Provost's office, partly through a joint, NSF-funded project with Cornell University, and partly in collaboration with the Weatherhead Center for International Affairs. These outreach activities, including several highly interdisciplinary workshops are described in more detail below. Additional details may be found on the Program web site.

Interfaculty Initiative

In 2000-2001, Jasanoff chaired the Interfaculty Group on Genetics, Biotechnology and Society for a second year. This group aimed to identify cross-cutting ethical, legal and social issues raised by the intersection of genetics, biotechnology and society. In 2001, the group sponsored a colloquium series featuring scholars in genetics from major research universities, as well as a workshop, *Owning Up: Bodies, Selves and the New Genetic Property*, which featured speakers not only from all across Harvard, but also from Cornell, MIT, Tufts, and Duke Law School, as well as from government, industry, and activist communities.

Workshops

The Program organized and hosted four workshops this year:

1. *Machinery of Representation: Voting Technologies and the 2000 Presidential Election* was held on March 15-16, 2001 at the Kennedy School and was co-sponsored by the Department of Science and Technology Studies (S&TS) at Cornell University. The workshop, which brought together a group of about two dozen S&TS researchers, political scientists, historians, media scholars, engineers, and others with relevant expertise, focused on the epistemological and sociotechnical dimensions of the contested vote in Florida, examining the issues raised for science and technology studies, as well as for related political, policy, and legal analysis. One outcome of the stunningly close vote in Florida was an unprecedented public display of the machinery for representing the popular will through the casting and counting of votes. Intense public scrutiny of the Florida process showed, predictably in many ways, that this machinery is not a simple, unproblematic instrument for objectively registering votes but a large sociotechnical system, involving a complex mix of humans, machines, institutions, and procedures. The election controversy demonstrated that the ability of this machinery to produce credible representations of the voice of the people is thoroughly open to question. The episode dramatized many central themes in science and technology studies and made them relevant to a new and extremely important domain—that of US presidential politics. These themes include: the design and operation of technological systems; the epistemology of voting and the attribution of competencies; the struggle over different forms of expertise and knowledge; and the tensions surrounding objectivity, impartiality, fairness, and legality. The workshop, which was organized around these key themes, was the first component of a larger project that will include a special collection of materials and records related to the 2000 Presidential election which will be housed at Cornell University. Several short papers arising from the project will appear in a forthcoming issue of *Social Studies of Science*; a panel has also been planned for the next annual

meeting of the Society for Social Studies of Science.

2. *Localizing and Globalizing: Knowledge Cultures of Environment and Development* was held on April 7-8, 2001 at the Kennedy School. This workshop, co-organized by GEA research fellow Dr. Marybeth Long Martello and funded by the GEA project, brought together rich empirical and theoretical analyses of the localization and globalization of environmental knowledge in historical, contemporary, and comparative contexts. The presenters explored the place of local knowledge within modernist modes of knowing and governing, the political economy of local knowledge, local knowledge in global environmental politics, the competing knowledge cultures of industrial societies, and the implications of these phenomena for environment-development policy. The workshop addressed several common themes. What precisely is local knowledge, and does its ascendancy threaten the universal status of “science”? What are the historical roots of contemporary interest in different knowledges? Who speaks for local knowledge and with what authority? What are the political and economic implications of local knowledge? And if science begins to be supplemented by other forms of knowledge, then what pitfalls, obstacles, and opportunities might the multiplying of knowledge cultures present for public policymaking? This workshop, a follow-up to last year’s workshop on a related theme, was also the springboard for a book project currently being co-edited by Jasanoff and Long Martello.
3. *Biotechnology and Global Governance: Crisis and Opportunity*, sponsored by the Weatherhead Center for International Affairs, together with the Kennedy School of Government, the Asia Center, the University Committee on Environment, and the Program on Negotiation, was held on April 26-28, 2001 at Harvard University. This conference brought together over 35 major international players from science, industry, government, NGOs, and academic social sciences for a focused, two-day meeting in order to build new insights in three major areas: emerging institutional responses to managing scientific uncertainty; changing roles of consumer and public participation in governmental and corporate decisionmaking; and principles of accountability in knowledge production, ownership, and use. In recent years, the crisis of governance around the life sciences, centering particularly on the use of genetic modification (GM) in agriculture and food production, has extended far beyond the fate of a major sector of the world economy. Together with events like the outbreak of “Mad Cow disease” in the UK, the GM controversies point to unresolved institutional and political deficits that need to be watched and addressed in coming decades: the public’s loss of trust in experts; the disagreements surrounding biotechnology’s ethical, environmental, and social consequences; the non-generalizability of national regulatory cultures; the undefined nature of corporate responsibility; the lack of harmonized international standards for risk assessment and compensation. The conference explored these problems and how to protect society from the significant intellectual and administrative challenges that will accompany the globalization of biotechnology.
4. *Owning-Up: Bodies, Selves, and the New Genetic Property* was held on May 4-5, 2001 at the Kennedy School. The workshop, co-organized with STPP fellow Jennifer Reardon, was sponsored by the Interfaculty Initiative on Genetics, Biotechnology and Public

Policy. It addressed contemporary debates around genetic research and technology that have raised significant challenges to taken-for-granted assumptions about intellectual property. Recent years have witnessed the reopening of fundamental questions concerning the relationship between law and the inventive process. This workshop asked such questions as: Who is an inventor? What is an invention? Are property claims asserted only through the law? Does innovation curtail rights or simply expand them? sought to explore questions about property and ownership that have begun to link up with emerging genomic ideas and practices. In examining how property claims relate to new genetic understandings of the natural world, the human body, and the self, the workshop drew on analyses of specific cases and legal decisions, emergent practices, and evolving theoretical debates. It engaged with previously unrecognized normative dimensions of patent law, revealing how legal regimes and their underlying values not only reward but help to shape innovation in genomic research. The workshop considered how intellectual property regimes can better balance society's urge to innovate with the varied social, cultural and scientific values that are implicated in the creation of genetic property.

Assistant Professor Jean Camp's work during the year continued to focus on how different societal values are integrated into technology, how technical policies can force values to be hardwired into technology, and how technology develops value through adoption in organizational and institutional cultures.

Camp's work with Carolyn Gideon illustrates that certainty of bandwidth and certainty of price are mutually exclusive in a statistically shared network (of which the Internet is the canonical example). Using standard queuing models, they show that increasing certainty in bandwidth results in decreased certainty in price. Conversely, setting a constant price with cost-based pricing in a statistically shared network results in delay. They show this for both the "intserv" and "diffserv" protocols.

Camp's work with Helen Nissenbaum and Cathleen McGrath contributed to both computer science, and social science. This group surveyed the findings in social psychology and philosophy with respect to trust, concluding that approaches designed to empower users to be their own security managers may be based on a flawed view of human-computer interaction. Camp, Nissenbaum, and McGrath suggested specific design changes that would bring the design of security tools more closely into alignment with the human perception of computers.

Camp pursued a number of outreach efforts designed to bring the insights from her research to bear in the making of policy. She is taking part in the National Research Council's panel on "Internet Searching and the Domain Name System." She was the principal author of a letter from the Institute of Electrical and Electronic Engineers (IEEE) on the need for a computer security exception in the Digital Millennium Copyright Act (DMCA), and assisted in drafting a letter from Computer Professionals for Social Responsibility on the need for an exception for filtering programs in the DMCA. These were the only two regulatory exceptions made under the DMCA, as of May 2001.

Camp met with the Estonian Ambassador to the United States to discuss the advantages and disadvantages of various World Trade Organization and World Intellectual Property

Organization proposals for Estonia -- a small well-educated country seeking to preserve cultural autonomy. Similarly, she met with a cabinet official from Chile to discuss mechanisms for providing universal service.

Camp presented a keynote address, "When Data=Death: Security for Medical Information Systems," at the IEEE 3rd International Conference on "Information Technology Applications in Biomedicine," in November 2000, along with a plenary address on "Unintended Consequences of Design" at the "Photonics East" conference of the International Society for Optical Engineering, also in November. In addition, she outlined a proposal for "Information Technology: Licensing for the Developing World" at BCSIA's workshop on "Global Governance of Biotechnology," described elsewhere in this report.

Finally, during 2000-2001 Lecturer Dorothy Zinberg continued her research on several aspects of the intersection of international science, technology, and society: the changing roles played by, and arrangements among, industries, universities, and governments as a function of the increasing commercialization of science; the major changes in universities brought about by the information technologies and biotechnology; and the ever-changing patterns of education and career development for scientists and engineers. Zinberg delivered invited addresses on these topics in New York, Washington, Japan, Brazil, Britain, France and Israel, and was appointed a Visiting Professor at Imperial College (London). Zinberg also writes a monthly column, "World View," for the (London) *Times Higher Education Supplement*, which is also syndicated by the San Jose Mercury News.

VII. CONTINUED COMMITMENT TO TEACHING

Training the next generation of science and technology policy scholars and policymakers is a core commitment of the STPP program. Science, Technology, and Public Policy is one of the Policy Areas of Concentration (PACs) offered to Masters in Public Policy students at the Kennedy School. Students with this concentration can take not only courses labeled as science and technology policy, but related courses from the environment concentration, the security concentration, other schools at Harvard, as well as other universities in the Boston area. Moreover, the courses offered in this PAC are of interest to a broad range of students beyond those focusing specifically on science and technology policy.

These courses are *not* restricted to students with strong backgrounds in science and technology. People who work at the intersection of S&T with public policy in the "real world" come to this intersection with a wide variety of backgrounds, and KSG graduates with many different specializations and job descriptions are likely to encounter interactions between science, technology, and public policy in some phase of their work. Indeed, the array of contemporary challenges and opportunities involving the interaction of S&T with public policy – AIDS, energy, genetic engineering, global environmental change, industrial ecology, the Internet, nuclear weapons, telecommunications, toxic substances, transportation, and more – command the attention and understanding of all citizens.

STPP's teaching has two primary orientations. The first entails the study of the *processes and methods* by which public-policy decisions about S&T or involving S&T get made. This focus

includes: attention to the methods used by analysts of science, technology, and public policy issues to compare alternative courses of action; the means and institutions through which policymakers obtain S&T advice; how public and private interests and decision making about these matters interact; and exploration of how scholars study the interactions of S&T with policy. The second orientation entails the study of particular *issues* where the interactions of S&T with public policy raise difficult and important problems. Such issues include: nurturing technological innovation systems for industrial productivity and competitiveness, for national defense, and for environmental sustainability; developing national and international energy strategies; managing nuclear-energy and nuclear-weapons technologies; shaping and administering the evolving global information infrastructure; and determining the appropriate levels of public support for basic science and for S&T education, among many others.

During the 2000-2001 academic year, in the processes and methods orientation, Associate Professor Hart taught the introductory STPP survey course, “Science, Technology, and Public Policy,” while Lecturer Dorothy Zinberg taught the follow-on “Seminar in Science, Technology, and Public Policy,” in which students developed their required policy analysis exercises. STPP Director John Holdren taught “Issues in Science and Technology Policy: Designing and Conducting Interdisciplinary S&T Assessments for Policy,” which explored the detailed mechanics of conducting interdisciplinary studies of major issues at the intersection of science, technology, and public policy, drawing on a wide range of case studies. Professor Sheila Jasanoff taught “Critical Perspectives on Policy Analysis,” which critiqued the rationalist assumptions underlying much policy analysis and examined how institutions can better learn from past experience, and “Science, Power, and Politics,” a seminar exploring the relationships among science, technology, and political power in contemporary societies.

In the orientation on specific science and technology issues, Professor Jasanoff taught “Law and the Life Sciences”; Professor F. Michael Scherer taught “Technology, Innovation, and Economic Growth”; and Associate Professor David Hart taught “Technological Innovation for Economic Growth: Knowledge, Entrepreneurship, and Governance.” In addition, STPP faculty taught a broad range of courses focused on policy issues related to information technology. Assistant Professor Jean Camp taught “The Mechanisms and Methods of Internet Commerce,” “Internet Commerce and the Information Economy,” and, with Jonathan Zittrain, “The Internet: Business, Law, and Strategy.” Assistant Professor Viktor Mayer-Schoenberger taught “Virtual Diplomacy.” Adjunct Lecturer Deborah Hurley, director of the Harvard Information Infrastructure Project, taught “Autonomy and Information: The Relationship Between the Individual and Government,” while senior fellow and adjunct lecturer Nolan Bowie taught “Information and Media Regulation and Public Policy.” Holdren and Professor William Clark taught “Environmental and Resource Science for Policy,” providing an introduction to the key scientific and technical issues relevant to environmental and resource policy, and Holdren and Lecturer Henry Lee taught “Designing and Managing Energy Systems,” introducing students to energy technology and policy, including engineering, economic, environmental, and institutional issues in the development and selection of energy options in industrialized and developing countries.

PUBLICATIONS

To review publications of the Science, Technology, and Public Policy Program and its members, see page 230.

EVENTS

To review events of the Science, Technology, and Public Policy Program and its members, see page 207.

Strengthening Democratic Institutions Project

MEMBERS

Graham T. Allison, Jr., Director
Melissa Carr, SDI Project Coordinator and Program Director, Caspian Studies Program
Brenda Shaffer, Research Director, Caspian Studies Program
Stefan Zhurek, Executive Director, Moscow Initiatives
Ben Dunlap, Research Assistant
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Emily Goodhue, Staff Assistant
Vladimir Boxer, Fellow, SDI Project
Maury Devine, Fellow, Caspian Studies Program
Mitchell Orenstein, Fellow, SDI Project
Peter Rutland, Fellow, Caspian Studies Program
Kazim Azimov, Associate, Caspian Studies Program
Pamela Jewett, Associate, SDI Project
David Rekhviashvili, Associate, SDI Project

BACKGROUND

The Strengthening Democratic Institutions Project (SDI) was created at the John F. Kennedy School of Government in 1990 by Graham Allison and David Hamburg, then President of Carnegie Corporation of New York, to catalyze Western support for the political and economic transformation of the Soviet Union. The project became part of the Belfer Center for Science and International Affairs in 1995 when Dr. Allison was appointed Director of the Center.

SDI's mission is to catalyze support for three great transformations underway in Russia and the other countries of the former Soviet Union: to sustainable democracy, free market economies, and cooperative international relations. SDI seeks to understand these transformations, interpret them for Western audiences, and encourage initiatives that increase the likelihood of success.

The transitions to democracy, market economy, and cooperative international relations in each of the independent countries of the former Soviet Union have met with varying degrees of success. Each country has experienced numerous challenges during this period and the transitions have taken different forms in each place but without a doubt, each of the countries in the former Soviet Union is a dramatically different place today than it was ten years ago.

At SDI we follow the details of the transition processes in these countries and ask Lenin's old question – "*Shto Delat?*" Or "what is to be done?" by international and domestic actors to solidify these transitions and improve U.S. relations with these countries? SDI identifies critical junctures at which timely action by governments and non-governmental actors can make a decisive difference; engages key actors professionally, intellectually, and personally; and provides targeted intellectual and technical assistance.

RESEARCH AGENDA AND POLICY OUTREACH

SDI's activity for the 2000-2001 academic year was focused on the following two major research programs and three technical assistance projects:

- I. THE CASPIAN STUDIES PROGRAM**, which seeks to understand and advance U.S. political, economic, and security interests in the Caspian Basin. Through the Program's research, outreach, and teaching, it seeks to raise the profile of the region's opportunities and problems and to encourage dialogue among policymakers, scholars, and practitioners in order to focus the debate in ways that produce effective policy toward and for the region.
- II. DEEPENING RUSSIA'S DEMOCRACY PROGRAM**, which focuses on research and analysis of Russian domestic politics, economics, and foreign policy, the status of the institutionalization of democracy in Russia, and issues of concern to the U.S.-Russian bilateral relationship. Through the Program's research, outreach, events, and publications, SDI seeks to understand Russia's transition to democracy, interpret events and trends for Western audiences, and encourage initiatives that increase the likelihood of success.
- III. THE U.S.-RUSSIAN INVESTMENT SYMPOSIUM**, which focuses on the single largest challenge for the Russian economy in the decade ahead – attracting private-sector international direct and equity investment – and reviews the Russian economic and business climate, and opportunities and obstacles for Western investment in the Russian Federation.
- IV. THE RUSSIAN INFORMATION REVOLUTION PROJECT**, which helps identify policies and catalyze actions that will help Russia become a world leader in the field of software and technology development in order both to increase economic development and to sustain an open society.
- V. THE MOSCOW TELECOMMUNICATIONS PROGRAM**, which provides videoconferencing capability to senior officials in Moscow so that they may consult on issues pertaining to politics, business, and economics with experts at the Belfer Center for Science and International Affairs and others in the Harvard and Boston communities.

I. THE CASPIAN STUDIES PROGRAM

The 2000-2001 academic year was the second year of the Caspian Studies Program and Azerbaijan Initiative at the Kennedy School. The Program was established in 1999 with funding from a generous grant from the U.S.-Azerbaijan Chamber of Commerce and a consortium of companies including ExxonMobil, Chevron, and Aker-Maritime (in conjunction with CCC and ETPM). Through the Program's research, outreach, and teaching, it seeks to raise the profile of the region's opportunities and problems, and utilize Harvard resources to train new leaders who will help shape the future of the region. By establishing a dialogue among policymakers, scholars, and practitioners, the Program hopes to focus the debate in ways that produce effective policy toward and for the region.

The Program's main objective is to locate the Caspian region on the maps of the American policy-making community as an area in which the U.S. has important national interests and where U.S. policy can make major differences. That community now recognizes the Persian Gulf as a region of strategic interest for the United States. Accordingly the Caspian region should be recognized first as a location that includes a number of significant countries in which the U.S. has serious strategic interests and second as an arena in which policies of the U.S. government, actions of the business community, and research, outreach, and training by universities can make a significant difference. The U.S. policy community includes: the Executive and Legislative branches of government; the analytic community that surrounds these institutions (including think-tanks, universities, NGOs); and the press. In a noisy environment, the goal of the program is to identify the Caspian for the policymaking community as a location of importance; to explore and explain the special opportunities and risks in this region; and to identify actions that the U.S. government, other governments, NGOs, universities, and others can take in order to make a difference in the region. Similarly, the Program seeks to increase the understanding of U.S. policy among the Caspian region's leaders and populations.

CASPIAN STUDIES PROGRAM RESEARCH

The Caspian Studies Program's Research agenda is focused on three tightly-connected issues which are of importance to the Caspian region: (1) American national interests in the Caspian Basin; (2) Specific geopolitical realities and trends in the states bordering the Caspian Basin; and (3) U.S. political, economic, and security strategy toward the Caspian. The research component of the Program seeks to inform policy and academic debates about these issues through policy briefs, working papers, books, articles, presentations, and reports emerging from the Program's conferences and seminars.

BCSIA Director and Caspian Studies Program Chairman Graham Allison and BCSIA Board Member Ambassador Robert Blackwill were the lead authors of the report from the Commission on America's National Interests which was issued in July 2000, was widely circulated among policymakers, and establishes a hierarchy of American national interests which has been used as a means of guiding U.S. policy. The Commission includes 23 members many of whom are currently in leading roles in the new Administration or the Congress, such as Condoleeza Rice, Richard Armitage, John McCain, Pat Roberts, and Bob Graham. The report names the Caspian Basin a geopolitical crossroad that "demands more attention by American policymakers" and cites the Caspian as "the most promising new source" of world energy supplies, in an era when it is a *vital* U.S. national interest that "there be no major sustained curtailment in energy supplies to the world."

Brenda Shaffer's research continues to focus on the specific geopolitical realities and trends in the states of the region and on their relations with one another and with the U.S. Her book on the history of the Azerbaijanis in both Soviet Azerbaijan (and its successor the Republic of Azerbaijan) and Iran, is one of the Caspian Studies Program's forthcoming book projects. Brenda is the editor of another book that the Program began working on this year – an edited volume that examines the issue of *Culture and Foreign Policy: Islam and the Caspian Region*. This year Brenda has also published *Partners in Need: Russian—Iranian Strategic Cooperation*

and Relations (WA, DC: The Washington Institute for Near East Policy, 2001). In addition to these books, Shaffer has published numerous articles and op-eds over the course of the year in a wide variety of journals and papers including *The Boston Globe*, *Caucasian Regional Studies*, *International Herald Tribune*, and *Nationalities Papers*.

Maury Devine continued her research on the international lessons learned in energy development, particularly about the relationships between business and government, which can be applied to the Caspian Region. The former President and Managing Director of Mobil Exploration in Norway, Maury is examining the State Oil Fund of Azerbaijan, the Norwegian State Oil Fund and other examples of oil funds around the world, comparing their structures and successes, and articulating best practices for international implementation. In addition, Maury began a project looking at the feasibility of the Baku-Tbilisi-Ceyhan pipeline project and of potential alternative transportation routes.

In addition to these individuals' research projects, The Caspian Studies Program produced a number of research products, the most substantial of which was a 1,000 page *Caspian Region Source Book*. This comprehensive collection of primary documents on the Caspian Region was distributed to security experts and U.S. officials at the Program's conference on U.S.-Russian Relations, and was subsequently distributed to a number of researchers, practitioners, officials, university libraries, Library of Congress and research programs as well as posted on the Program web page.

During the 2000-2001 academic year, the Caspian Studies Program launched a new Policy Brief publication series; these policy briefs are designed to analyze crucial issues relating to developments affecting the Caspian Region and to propose policy recommendations where appropriate. These briefs are geared toward the policymaker in Washington, but may be useful for policymakers in the Caspian region and in other countries that are actively engaged there. The Caspian Studies Program Policy Briefs are also effective tools for teaching contemporary issues and for use as background materials for theoretical test cases in academic courses. The Briefs published during 2000-2001 were: "Putin's Caspian Policy" by Carol Saivetz; "Military Cooperation between Georgia, Ukraine, Uzbekistan, Azerbaijan, and Moldova in the GUUAM Framework" by Tomas Valasek; "Energy Security: How Valuable is Caspian Oil?" by Lucian Pugliaresi; "Peace Pending in Nagorno-Karabagh: Recommendations for the International Community" by Blanka Hancilova; and "U.S. Policy Toward the Caspian Region: Recommendations for the Bush Administration" by Brenda Shaffer.

All the Caspian Studies Program publications, as well as summaries and transcripts of the seminars, are available on the Program's webpage which has also become a key resource for researchers from the region and those doing work on the region.

CASPIAN STUDIES PROGRAM SEMINAR SERIES

One of the main components of the Caspian Studies Program is its Seminar Series which features leading academics and key policymakers from the U.S. and from the Caspian region and addresses critical issues in the region. Each of the thirteen seminars in 2000-2001 was well-

attended and attracted a diverse audience of faculty, staff, researchers, graduate students, and community members who engaged in lively discussions. Summaries of each of these seminars are posted on the Program's web page, and seminars are often covered by Radio Free Europe / Radio Liberty and other media outlets.

The 2000-2001 seminar series focused on two main themes: conflict resolution in the Caucasus and Energy transport and pipeline politics in the Caspian region. Some of the highlights include: "Negotiations on Nagorno-Karabagh: Where Do We Go From Here?" with Ambassador Carey Cavanaugh, United States Special Negotiator for the Nagorno-Karabagh Conflict, Professor Hamlet Isaxanli, President and Founder of Khazar University in Baku, Azerbaijan, and Professor Ronals Suny, University of Chicago; "Conflicts in Georgia: Effects on Energy Transport and Regional Security" with Mr. Irakly Machavariani, Personal Representative of the President of Georgia on Political Problems of National Security and Conflict Resolution at the State Chancellery of Georgia; "The U.S. as a Catalyst in the Caspian Region" an off the record assessment of the past 2 years of U.S. policy in the region with Ambassador John Wolf, former Special Advisor to the President and Secretary of State for Caspian Basin Energy Policy; and "U.S. Caspian Energy Diplomacy: What Has Changed?" a frank and open discussion with Ambassador Elizabeth Jones, Senior Advisor for Caspian Basin Energy Diplomacy a few months after she transitioned into the position and just after she returned from a visit to the Caspian states.

In addition to the formal seminar series, Caspian Studies Program staff conducted numerous research meetings in Cambridge, Washington DC, and in the Caspian region with international scholars on issues related to the Caspian region, U.S. policymakers focused on the region, and policymakers from the region.

OUTREACH: ENGAGING GOVERNMENTS AND THE POLICY COMMUNITY

The Caspian region, with its rich oil reserves and its sensitive geostrategic location, is an important but little understood area of the world for U.S. policy. The key objective of the outreach component of the Caspian Studies Program is to engage members of the policymaking community, including Congress, on these issues; raising the profile of the Caspian for them and helping them better appreciate why it is of interest to the United States. By presenting the findings from the research agenda to the U.S. and other governments as well as to the press, think-tanks, and NGOs, the Program seeks to establish international dialogue among policymakers, scholars, and practitioners.

In the academic year 2000-2001, we have pursued these objectives through a variety of activities including: Program-sponsored conferences, media appearances by Program staff, participation in outside conferences, a vibrant Caspian seminar series, and individual meetings and briefings with U.S. and regional policymakers.

The Program sponsored two conferences in the fall of 2000. The first looked at "U.S.—Russian Relations: Implications for the Caspian Region." On the eve of the American Presidential elections, American and Russian policymakers and researchers gathered in Cambridge to discuss the ways in which US-Russian relations impact and are affected by events in the Caspian region. In addition to policymakers (such as Ambassador Carey Cavanaugh, United States Special

Negotiator for Nagorno-Karabakh and NIS Regional Conflicts, Jon Elkind, Director for Russian, Ukrainian, and Eurasian Affairs on the staff of the National Security Council, and Ambassador Anatoliy Adamishin, former Minister in charge of Russia's relations with CIS countries) and regional experts (such as Timothy Colton, Carol Saivetz, and Lis Tarlow of the Davis Center for Russian Studies and Fiona Hill of the Brookings Institution), special efforts were made to include security and international relations experts from the Harvard faculty (such as BCSIA's own Steven Miller, Stephen Walt, and Monica Toft) in order to introduce them to the specifics of the Caspian – which they might want to use as a case study in their research or teaching—and to solicit their broad ranging expertise in order to inform the debate and discussion.

The second conference, which was co-sponsored with the Belfer Center's International Security Program (ISP) and with the German Council for Foreign Relations (DGAP), was an international conference dealing with energy security. The conference was held in Berlin at the DGAP, and focused on international energy market trends, issues affecting energy security, and specific trends in the Caspian Region and the Middle East. Energy executives and researchers from a variety of countries attended, including from Germany, France, Sweden, Britain, the U.S. and Kazakhstan. The Harvard delegation to the conference consisted of Dr. Steven Miller, Dr. John Reppert and Dr. Brenda Shaffer and two researchers from Washington DC: Patrick Clawson and Lucian Pugliesi.

In addition to these Program sponsored conferences, Caspian Studies Program staff also presented the Program's research findings at other conferences in the U.S. and in the region. For example, Brenda Shaffer represented the Caspian Studies Program at several conferences including an IREX sponsored conference: "Regional Dynamics of the Black and Caspian Sea Basins Conference" held in Odessa, Ukraine and funded by the State Department and the Starr Foundation. Brenda led the concluding session on Research Methodology and Agenda for study of the Caspian and Black Sea Regions at the conference that included scholars and professionals from Armenia, Azerbaijan, Georgia, Kazakhstan, Moldova, Romania, Russia, Turkey, Ukraine, and the United States. Similarly, Melissa Carr also delivered a paper on "U.S. Policy and Interests in the Caspian Region" to an East/West Institute Conference on Black Sea Regional Security which was held in Baku and attended by government representatives and academics from six countries of the region.

The Program actively engaged U.S. and regional media in the Program's activities and frequently presented the research findings to the media. Melissa Carr and Brenda Shaffer each discussed Caspian issues and U.S. policy toward the region in various media outlets including: the BBC (in English, Russian, and Azeri); Israel Broadcasting Authority radio station; Voice of America (again in multiple languages); National Public Radio; and WorkdayTV.com. And, in Azerbaijan: Space Television News Show, Sumgait Television, and State Television News Show. Brenda Shaffer wrote a number of op-eds, which appeared in major newspapers, among them *The International Herald Tribune*, *The Boston Globe*, and *The Miami Herald* and she gave a large number of media interviews commenting on the Caucasus, Iran, and U.S. policy toward the Caspian region.

The Caspian Studies Program continues the strategy of engaging the policymaking community through invitations to Program events, publication distribution, and one-on-one or small group briefings with people such as Senator Lugar, Ambassador Wolf, Ambassador Jones, Ambassador

Sheehan, Ambassador Cavanaugh, Jon Elkind, Christina Rocca, and many other officials in the Legislative and Executive branches.

Reaching beyond Washington and engaging leaders from the region thereby expanding the dialogue to policymakers, scholars, and practitioners in the Caspian region is another major objective of the policy outreach component of the Program. To that end, Brenda Shaffer conducted an intensive ten-day trip to Azerbaijan, Armenia, and Georgia where she gave lectures, met with government officials, and made numerous media appearances. Some of the highlights from this trip include: conducting a day-long seminar on research methods, the political trends in the Caspian Region, roots of the Nagorno-Karabagh conflict and ideas for its resolution for officials from the Ministry of Foreign Affairs in Azerbaijan; delivering a lecture to the Georgian Parliament which was broadcast live on Georgian TV on “Current Geopolitics of the Caspian Region and Anticipated Trends in U.S. policy”; and conducting a Round Table lecture and discussion with representatives of various branches in the Armenian Foreign Ministry, hosted by Deputy Foreign Minister Reuben Shougarian. Similarly, during her trip to Azerbaijan primarily to interview scholarship candidates, Melissa Carr met with many officials from the Ministry of Foreign Affairs of Azerbaijan and scholars and researchers from Universities in Baku.

AZERBAIJAN INITIATIVE

The Azerbaijan Initiative of the Caspian Studies Program includes briefings, seminars, and events on critical issues related to Azerbaijan and provides funds for emerging leaders from Azerbaijan to attend programs at the Kennedy School. During the initial three years of the Caspian Studies Program, there are scholarships for four full-time graduate students to attend the mid-career Program and receive their Masters in Public Administration degrees and for ten individuals with extensive government experience in Azerbaijan to attend Executive Education Programs as USACC Fellows.

In 2000-2001, three students from Azerbaijan took the Kennedy School by storm and proved to be excellent ambassadors for their country by stimulating interest in Azerbaijan through formal presentations and informal discussions and interactions. At the same time, while pursuing their masters degrees in Public Administration at the Kennedy School, they formed new ideas about how best to help their country’s democratic and economic development. This year’s Kennedy School students from Azerbaijan were: Fuad Akhundov, Senior Inspector at the National Central Bureau of Interpol; Ramin Isayev, Senior Economist for Statoil; and Tahir Kerimov, Senior Specialist at the President's Foreign Relations Department. The students were honored as their names and fellowships were announced at the Presidential dinner where Azerbaijan’s President Heydar Aliyev and former U.S. national security advisor Zbigniew Brzezinski delivered speeches. Tahir Kerimov was called down to Key West, Florida and to Washington, DC to assist in President Aliyev’s negotiations with President Kocharian over Nagorno-Karabagh and to assist with the Aliyev-Bush visit in Washington, DC.

Fuad Akhundov, Ramin Isayev, and Tahir Kerimov spoke to over 100 graduate students in Starr Auditorium at the Kennedy School in a seminar they titled “Azerbaijan: Synthesis of East and West.” The seminar was an excellent crash course in “Azerbaijan 101,” touching on the political, economic,

social, and cultural history and present day situation in Azerbaijan. The multimedia presentation, featuring music, videotapes, maps of the country and the old city of Baku, charts with figures on the economy, and photographs of the Baku oil barons from the 19th century, was both educational and entertaining. It provided a wonderful opportunity for the Kennedy School community to learn more about Azerbaijan as well as the three students in the Masters in Public Administration Program. On September 24th 2000, “60 Minutes” aired a special on Azerbaijan and Baku, featuring an interview and tour with USACC Fellow Fuad Akhundov. This introduction to the history and culture of Azerbaijan also touched on United States policy in the Caspian Basin and the debate surrounding Section 907 of the Freedom Support Act, which restricts assistance to Azerbaijan.

The Caspian Studies Program and the Wexner-Israel Fellowship Program sponsored a dinner that brought together these Kennedy School students from Azerbaijan with Wexner fellows from Israel to discuss mutual perceptions and relations between the two countries. Ramin Isayev gave a slide presentation on Azerbaijan, and Fuad Akhundov responded to questions about the conflict with Armenia over Nagorno-Karabagh with an impromptu history lecture on the topic. Led by Brenda Shaffer, the Caspian Studies Program Director of Research, participants discussed the reasons for the good mutual relations between Israel and Azerbaijan. Eager to show it was not at odds with the Muslim world, Israel adopted a positive policy toward all six new Muslim states that emerged after the Soviet break-up. Meanwhile, Azerbaijan sought a partner in Israel, which it regarded as a potentially beneficial and powerful friend. Both groups found commonality as countries coping in “tough neighborhoods.” Students expressed interest in continuing the dialogue throughout the school year.

The four executive education participants during spring-summer 2000 programs similarly enriched the discussions and training for everyone involved in the Programs. Having returned home, these participants have been recognized for their achievements and advanced their careers. Afghan Abdullayev, then Dean of the School of Humanities at Khazar University, completed the “Leadership for the 21st Century” executive program. Elmina Kazimzade, Deputy Director of the Open Society Institute-Azerbaijan, completed the “Strategic Public Sector Negotiations” executive program. Elchin Amirbekov and Kamil Khassiyev, both then Heads of Division of International Organizations Department at the Ministry of Foreign Affairs, completed the “National and International Security Program,” and have since been promoted. Elchin Amirbekov is now Counselor at the Mission of Azerbaijan to NATO, and Kamil Khassiyev is Counselor at Azerbaijan’s Embassy in Vienna.

In February 2001, Melissa Carr, Program Director of the Caspian Studies Program, traveled to Azerbaijan to interview officials, executives, and leaders from the public and private sectors for admission and fellowships for the Kennedy School’s degree and Executive Programs. Four fellowships were awarded to provide emerging leaders from Azerbaijan the opportunity to sharpen their skills, knowledge and expertise through participation in Kennedy School Executive Programs. Chingiz Mammadov, Senior Program Officer at the National Democratic Institute’s Baku office, whose government experience includes a position as Chief of Media Relations in the President’s office, participated in the *Leadership for the 21st Century* Program in May 2001. Three USACC Fellows were also selected to enroll in Executive Programs during the summer of 2001. Altai Efendiyev, Head of the Department of Economic Cooperation and Development at the Ministry of Foreign Affairs, is enrolled in the *Senior Managers in Government* Program. Mr. Efendiyev’s colleague Fikret Pashayev, who is Deputy Head of the Department of Economic

Cooperation and Development, is taking part in the Program on *The Global Financial System: Structure, Crises, and Reform*. Pashayev and Efendiyev will use their Kennedy School training as they work on the restructuring of Azerbaijan's Ministry of Foreign Affairs. Finally, Murat Heydarov will visit the Kennedy School to participate in the *Senior Executives in National and International Security* Program, where he will interact with other senior leaders from the U.S. and around the world in the public and private sectors. Mr. Heydarov is currently a Senior Security Advisor at BPEX, Ltd., but plans to return to government service at the Ministry of Foreign Affairs in the near future.

INTEGRATING THE CASPIAN REGION INTO THE KENNEDY SCHOOL AND HARVARD'S TEACHING AND PROGRAMMING

In addition to the research, engagement, and fellowship components, the Caspian Studies Program has facilitated the direction of additional existing Harvard University resources toward activities focused on the Caspian region. By integrating these new activities into already existing programs, we have strengthened and enhanced their impact, gained heightened awareness and visibility, and generated and illuminated policy deliberations, while optimizing achievements.

By working with the Kennedy School's international programs office to publicize the educational opportunities available to students from other countries in the region, Caspian Studies Program staff helped to recruit the largest ever number of students from the countries of the former Soviet Union to study in degree programs at the Kennedy School. In 2000-2001 there were 15 students from the region (including Armenia, Azerbaijan, Georgia, Kazakhstan, Russia, and Ukraine). The Caspian Studies Program maintained close contact with these students throughout the year; the students participated in and helped inform the Caspian Studies Program's research, outreach, publications, and events.

In 2000-2001, the Caspian Studies Program continued to work closely with other organizations and departments at Harvard and at the Kennedy School to maximize exposure and study of the Caspian region. For example, this year's Executive Program for General Officers of the Russian Federation and the United States in January 2001 included a seminar led by Julia Nanay of the Petroleum Finance Company entitled "The Future of the Caspian Basin." Additionally, Graham Allison gave a seminar on "U.S. Policy toward Russia" and John Reppert led a day long workshop on a case-study in dealing with ethnic conflict. Both Allison and Reppert also met with the leaders of the Russian delegation and many of its members to engage them in direct conversations about numerous issues including the war in Chechnya, Russia's role in the Caspian region, the ABM treaty, and the state of U.S.-Russian relations.

In November 2000, the Kennedy School's Women Waging Peace Program hosted its annual Colloquium which included delegates from Azerbaijan, Armenia, Russia and Chechnya. The Caspian Studies Program held a series of meetings and small group research discussions with Arzu Abdullayeva from the Azerbaijan National Committee of the Helsinki Citizens' Assembly. Women Waging Peace and the Caspian Studies Program teamed up to host a seminar on "Civil-Society and Peace-Building in the North and South Caucasus" with three of the delegates.

Similarly, Caspian Studies Program staff collaborated with the Black Sea Regional Security Program staff and assisted with the recruitment of participants from Azerbaijan for the 3 week Executive Program that included representatives from the national security communities of ten countries in the region and the U.S. The two Programs co-hosted a dinner for the participants and the Ambassadors of the GUUAM countries (Georgia, Ukraine, Uzbekistan, Azerbaijan and Moldova) following the GUUAM Summit on May 31. Special guests in attendance were His Excellency Tedo Japaridze, Ambassador, Republic of Georgia; His Excellency Volodymyr Yatsenkivskyi, Minister Counsellor, Republic of Ukraine; His Excellency Hafix Mir Jalal Pashayev, Ambassador, Republic of Azerbaijan; and His Excellency Ceslav Ciobanu, Ambassador, Republic of Moldova. Gen. John Reppert of the Belfer Center delivered the keynote address at the dinner.

The Caspian Studies Program facilitated the inclusion of the Caspian region in the curricula of courses at the Kennedy School and at Harvard University more broadly. In 2000-2001 Graham Allison and Robert Blackwill's course on Central Issues in American Foreign Policy included a case on Caspian pipeline politics and the relations between business and government. Emily Van Buskirk and Graham Allison co-authored the case entitled "U.S. Policy on Caspian Energy Development and Exports: Mini-Case and Illustrative Paradigm" for the course. During the week when the students were studying the Caspian case and debating U.S. policy toward the region, the Caspian Studies Program hosted Ambassador Elizabeth Jones, Senior Advisor for Caspian Energy Diplomacy, at the Kennedy School. Together with Maury Devine, former Mobil executive, most recently the President and Managing Director of Mobil's affiliate in Norway, Jones led a discussion for students who had just finished the case study in the foreign policy course. Similarly, Melissa Carr provided curriculum advice for Margareeta Thuma's course at the Harvard Institute for Learning in Retirement: "The Silk Road Turns Polyester: Geopolitics in the Caspian Sea Basin." Carr and Kennedy School student Fuad Akhundov were guest speakers at the final session of the course where they presented on U.S. policy toward the Caspian region and the history, architecture and culture of Azerbaijan respectively.

II. DEEPENING RUSSIA'S DEMOCRACY PROGRAM

Today it is a foregone conclusion in Russia that leaders will be elected through democratic elections - but many of the institutions of democracy including free and independent media, an active civil society, reliable and independent law enforcement and judicial structures - are far from solidified. President Putin and his government's commitment to strengthening the state and improving economic conditions in the country have been welcomed by many Russians who were tired of the chaos and unpredictability of the 1990s and who had seen their standard of living plummet during the era of reforms and the financial crisis of 1998. However, many of the Putin government's efforts to strengthen the state have concentrated power into the hands of the President and strengthened the role of the military and security forces and thus weakened civil liberties and prompted fears of a return to authoritarianism in Russia. The ongoing war in Chechnya, the battle among media moguls and Kremlin forces over freedom of speech and independent media, and widespread corruption which most citizens encounter in some form or another in their daily lives illustrate some of the many challenges that currently face the country.

In its Deepening Russia's Democracy Program, SDI focuses on research and analysis of Russian domestic politics, economics, and foreign policy, the status of the institutionalization of democracy in Russia, and issues of concern to the US-Russian bilateral relationship. SDI informs Western policymakers and academics about the specific challenges to Russian democracy and the importance and implications of events and trends through reports, articles, seminar series, conferences, and briefings.

RUSSIA WATCH AND RELATED PUBLICATIONS

During President Putin's first few months in office, SDI produced two policy memos assessing and providing context for some of the President's initial actions in his new post. These memos are designed to provide concise, timely analysis of key events and policy developments in Russia that may be overlooked or insufficiently explored in the American press. The first memo focused on Putin's first State of the Nation Address, highlighting the new President's realism and the second analyzed Russia's New Foreign Policy Concept and its potential implications for the West and for Russia's neighbors.

Capping off SDI's efforts to increase understanding of the 1999-2000 electoral cycle in Russia, SDI compiled all issues of its flagship publication *Russian Election Watch* in a single compendium together with a preface by Davis Center Director Tim Colton and an introductory chapter authored by former SDI Research Associate Henry Hale examining what the 1999-2000 elections mean for Russian democracy. This volume, edited by Hale and entitled *Russia's Electoral War of 1999-2000*, provides important analysis of the Russian elections and will serve as an important reference for those seeking information on these elections in the future.

Building on the success *Russian Election Watch (REW)*, SDI responded to demand for the continued supply of information on Russia generated by *REW* by launching a successor publication, *Russia Watch*, focused on Russian politics more generally. Edited by Ben Dunlap, *Russia Watch* maintained many of the recognizable features of *REW* (concise, readable summaries of important events; key facts and figures; quotes from key figures on major happenings; and commentary from leading Russian analysts). In addition, each issue of *Russia Watch* focused on a particular issue critical to Russian democratization and leading experts were invited to contribute guest articles on this issue. For example, over the course of the 2000-2001 academic year, issues of *Russia Watch* focused on: Russia's Oligarchs; Russia's Remarkable Economic Recovery; Buttressing Russia's Democratic Freedoms; U.S. Russian Relations: A Turning Point; and Russia's Embattled Media.

POLITICAL PARTY BUILDING PROGRAM

Underlying SDI's success in raising the level of American understanding of Russian politics is its continued and longstanding direct engagement with primary Russian political actors themselves. Since 1994, SDI has worked directly with the leadership of the principal democratic reformist parties on party-building at the local level through its Russian Political Party-Building Program, and has sought to maintain active relations with all major political movements in Russia regardless of ideology. To complement other programs that rely primarily on sending Western experts to Russia to address party-building and campaigning issues, SDI's Party-Building Program has emphasized bringing small groups of top Russian political party leaders to the

United States to observe Western experiences firsthand, allowing them to meet American counterparts as equals and to reflect on their own experiences and needs from a distance.

The 1999-2000 elections in Russia provided parties with a major impetus to strengthen their organizations and to avoid fractionalization, two issues that have long proved troublesome for the development of Russia's political party system. Almost all of Russia's major leaders now understand that organization is important and that they need to unite with others of similar views if they are going to survive in Russian politics long into the future. With the assistance of a grant from the Charles Stewart Mott Foundation, SDI was able to continue this venture in 2000-2001 and organize three political party building programs.

In September 2000, SDI teamed up with the National Democratic Institute (NDI) to host a delegation from Yabloko and SPS for a party-building program in Washington, D.C. and Cambridge. The delegation included two members of SPS and four members of Yabloko, including Mr. Valery Airapetov, Chief of Staff for the Yabloko Party in the Russian Duma and also the individual who had coordinated, from the Russian side, a delegation of pollsters to SDI's party-building program in August 1999. The issue of "primaries" has been very topical for the reformist movements Yabloko and SPS these days, as they have over the past year been experimenting with using their own brand of primaries as a way to choose candidates that would have the united backing of Russia's reformist forces. In May 2000, for example, these two parties held a joint primary in order to select a single candidate for the St. Petersburg gubernatorial race. While participating in a previous SDI party-building program, SPS Executive Director Boris Mints said that he favored primary elections as a party-building tool, especially in SPS' relationship with Yabloko.

SDI and NDI therefore included a week-long program in Massachusetts during the September 2000 primary season following the group's program in Washington D.C. During their stay in Massachusetts, the delegates attended party-building meetings with leading scholars, campaign strategists, and political candidates; visited candidate campaign headquarters two days before the primaries took place; gave a seminar at Harvard for the University's leading specialists on Russia; observed the September 19 primary elections at various polling places in the Boston area; and participated in post-election discussions and meetings. Former SDI Research Associate Henry Hale accompanied the group for much of their visit, and answered the Russians' questions about US parties and politics, directed their attention to important aspects of American party democracy, and discussed with them many of the issues that they are currently facing as they strive to build strong parties.

In February, SDI hosted Andre Kosmynin, a member of the Yabloko faction's analytic team. SDI facilitated Kosmynin's participation in the Kennedy School's Program "Campaign for President: The Managers Look at 2000." The Program brought together key players in the United States' presidential campaign to discuss the campaign strategies; each party's primary and convention; the debates; "war stories" from each campaign; lessons learned; and the general election and ensuing events in Florida. By interacting with top-level campaign managers and key campaign analysts, Kosmynin gained an inside view into the U.S. system and learned valuable campaign strategies and tools which he brought home to share with his colleagues in Yabloko. During Kosmynin's visit, SDI also hosted a number of research discussions with him

to discuss the status of democratization in Russia, the current situation in the Yabloko party, Yabloko's experiences in the 1999-2000 elections, and numerous current issues on the domestic and foreign policy agendas in Russia.

In June, SDI hosted Vyacheslav Igrunov, Deputy of the Russian State Duma, Yabloko Party faction and Vice-Chairman of the Committee on CIS Affairs and Andrei Mironov, human rights activist from Memorial. Igrunov gave a public lecture on "The Future of Russian Democratic Development" which took a long-term view of the situation in Russia and identified the main and most important threats to Russia's democratic development as having taken place not in the current period under President Putin, but rather in 1992-1993 particularly with the creation of extensive presidential powers in the new Constitution. Although he envisioned a period of more authoritarian rule under Putin, Igrunov also anticipated that this would be a temporary trend. SDI also hosted research meetings with Igrunov and Mironov who shared their views on a wide variety of issues including: the current human rights situation in Russia, the development of the Yabloko party, war in Chechnya, and US- Russian relations. SDI also facilitated Igrunov's schedule in Washington DC and arranged meetings for him with key representatives from the National Democratic Institute (NDI), the National Endowment for Democracy (NED), and the Carnegie Endowment for International Peace.

As background for its party-building program, SDI published an updated version of *The Russian Political Party Building Handbook* in Russian. The new updated version includes an introduction from David King, Associate Professor of Public Policy at the Kennedy School and faculty adviser for the Kennedy School's Executive Education program for Russian Duma Members and Staff.

OCCASIONAL SEMINARS

Over the course of the year, SDI sponsored thirteen seminars on issues of key importance to Russia's democratic development, numerous smaller research team meetings with visitors from the Russian and U.S. policymaking communities, and weekly viewings of Russian television station NTV's political satire program "Kukly" (Puppets) and news program "Itogi" for Russian speaking members of the Harvard and local community.

The 2000-2001 seminar series focused on the status of Russia's democracy and some of the key institutional pillars to a democratic society such as an independent media, civil liberties and human rights, and an independent judicial system. Some of the highlights of the 2000-2001 seminar series were: a roundtable discussion co-sponsored with the Davis Center for Russian Studies entitled "Putin's First Year: How Good, How Bad?"; seminars on human rights, judicial reform, and the rule of law with human rights activists Andrei Mironov and Lev Ponomarev, with Duma Deputy and human rights advocate Vyacheslav Igrunov, and with honored lawyer and former Judge Sergei Pashin; seminars on the situation with the media in Russia with Ivan Zassoursky, journalist and researcher from Moscow State University, and with Veronika Sivkova from the Russian weekly paper *Argumenti I Fakti*; and seminars assessing the status of Russia's democracy and the future of democratic development in Russia under President Putin with representatives and Duma Deputies from the Yabloko and SPS parties, with Michael McFaul, Senior Associate at the Carnegie Endowment for International Peace and Assistant Professor at

Stanford University, with Emil Pain, Galina Starovoitova Fellow at the Kennan Institute at the Woodrow Wilson Center.

SDI staff and affiliates also held research meetings with a wide range of guests including: former Russian Minister of Defense and current Deputy in the Russian State Duma, Andrei Kokoshin; United States Ambassador to Russia, James Collins; Chief of the Russia, Ukraine, and Commonwealth Branch at the State Department Office of Research, Steve Grant; Deputy in the Russian State Duma, Vyacheslav Igrunov; and Editor in Chief of Russia's weekly newspaper *Argumenti I Fakti*, Andrei Uglanov. Similarly, in November 2000, SDI held a number of research meetings on the status of the media, human rights, the environment, and democracy in Russia with nine delegates from Russia and Chechnya who attended the Kennedy School's Women Waging Peace Program's annual Colloquium.

IV. THE U.S.-RUSSIAN INVESTMENT SYMPOSIUM

In 1996, Russian Prime Minister Viktor Chernomyrdin identified the attraction of private-sector international direct and equity investment in Russia as the single largest challenge for the Russian economy in the decade ahead and approached Harvard's SDI Project to host a U.S.-Russian Investment symposium. The resultant Symposium on "Financial and Direct Investment Opportunities in Russia," created by then Associate Director Fiona Hill and Executive Director for Moscow Initiatives Stefan Zhurek, reviewed the Russian economic and business climate and opportunities and obstacles for Western investment in the Russian Federation. By January 1999, the Symposium had become the largest gathering of senior Russian and Western business and government leaders in the United States.

Although the past three Symposia were held in January, this year, due to the Russian electoral cycle, anticipated Y2K complications, and past experience with New England winter weather the event was postponed until October 2000. Leading up to the event, SDI Director Graham Allison, BCSIA Executive Director John Reppert, SDI Fellow Vladimir Boxer, and Executive Director for Moscow Initiatives Stefan Zhurek worked to engage new leaders from Russia and the U.S. in the Fourth Annual U.S.-Russian Investment Symposium. During multiple trips to Russia, Allison and Boxer worked closely with German Gref, Director of the Center for Strategic Development and key economic advisor to Russian President Vladimir Putin, as he and his team developed Russia's new economic program.

At the Belfer Center, Elena Chesheva, who graduated from Harvard University's Kennedy School of Government with a master's degree in public administration in 2000, worked as a full-time research analyst for the Symposium. Catherine Gorodentsev, a graduate of Georgetown University's School of Foreign Service worked part-time as coordinator. Michele Circosta, Staff Assistant to the Belfer Center Executive Directors, assisted the U.S.-Russian Investment Symposium Team with its administrative needs.

The Fourth Annual Harvard U.S.-Russian Investment Symposium, "New Leadership, New Opportunities" was held in Boston from October 5-7, 2000. The event was cosponsored by the Belfer Center for Science and International Affairs, the Conference Board, the Financial Times,

and the U.S.-Russia Business Council. As is reflected in the title, this year's event was particularly important for both sides, as both Russia and America elected new presidents in the same year. President Putin has described foreign investment as a critical aspect of Russia's full economic recovery and has expressed his commitment to creating an environment where substantial and sustained foreign investment is possible.

The U.S.-Russian Investment Symposium gathered the most knowledgeable and influential people from both the West and Russia to seriously discuss what lies ahead. Russia has come a long way toward stabilizing its economy since the crisis of August 1998. In part as a result of higher prices for Russia's abundant natural resources and in part a result of the stimulus to the Russian domestic economy from a discounted ruble, Russia has largely recovered and is building its financial reserves. Many of America's leading corporations have returned to Russia or established new investments there, including McDonald's, Caterpillar, Intel, General Motors, Ford, and Gillette. Investment firms are reevaluating their portfolios to decide if funds should be transferred to the Russian economy. In this environment, the U.S.-Russian Investment Symposium, which provided an opportunity for parties from business and government from both sides to engage in candid face-to-face discussions that can cut through the misinformation that has accumulated from the past, was a more important event than ever before.

German Gref, Minister for Economic Development and Trade, and Lawrence Summers, Secretary, U.S. Treasury Department, gave the keynote talks to kick-off the event. George Soros, President and Chairman, Soros Fund Management; James A. Harmon, President and Chairman, Export-Import Bank of the U.S.; and Norman Mineta, U.S. Secretary of Commerce each delivered keynote addresses during the following days.

In addition to focusing on the theme of new leadership and new opportunities, the 2000 Symposium highlighted the opportunities for investment in Russia's technology and software sectors with a full afternoon devoted to panels entitled "High Technology Developments as Investment Opportunities" and "Development of Internet: The Information Revolution and Russia."

During the first day Stanley Fischer, First Deputy Managing Director, International Monetary Fund; Charles Frank, First Vice President, European Bank for Reconstruction and Development; George Muñoz, President and CEO, Overseas Private Investment Corporation; David Jones, President and CEO, Delta Capital Management and The U.S.-Russia Investment Fund (TUSRIF); were joined via videolink by Johannes Linn, Vice President for Europe and Central Asia, The World Bank to provide the view from the international financial institutions. They were followed by Gref; Eugene Lawson, President, U.S.-Russia Business Council; Vladimir Kozhin, Chief of Staff, Presidential Administration; Alexander Pochinok, Minister for Labor and Social Policy; Tatyana Paramonova, First Deputy Chair (First Vice President); Central Bank of Russia; Michael Khodorkovsky, CEO, Yukos; Jan H. Kalicki, Counselor, U.S. Department of Commerce; and Jim Nail, Head of Research, ATON who spoke about changes within Russia and Russia's strategic economic plan for the national economy and foreign investment. The rest of the first day was devoted to panels about the challenges and opportunities of investing in Russia's regions.

The final day of the Symposium was devoted to the well-attended and highly successful technology and internet plenary discussions and to breakout sessions which addressed key sectors of the Russian economy including: Trade; Banking and Finance; Energy; Telecommunications; Real Estate and Construction; Aviation and Space and which addressed key issues for foreign investors in Russia including: Legal Environment; Taxation; Corporate Governance; and Protection of Investors.

During the 2000-2001 academic year, work also began on the planning of the fifth annual Russian Investment Symposium which will be held in November, 2001 and is entitled "Reform and Renewal."

V. THE RUSSIAN INFORMATION REVOLUTION PROJECT

The Russian Information Revolution Project helps identify policies and catalyze actions that will help Russia become a world leader in the field of software and technology development in order both to increase economic development and to sustain an open society. The project engages Russia's top leadership in efforts to create an environment conducive to the development of the software and technology sector of the economy and reviews and tracks trends and developments in this realm. Based on these interactions and research, the Program identifies actions that national and local governments in Russia, foreign governments, and international agencies can take that would promote, or alternatively hinder, the development of Russia's information industry.

Russia, as a country with extraordinarily well-trained mathematicians, scientists, and engineers, many of whom have suffered a decline in income during recent years of economic turmoil, has an opportunity to follow its own version of the path India has taken to become the third most significant player in the Information Revolution (after the U.S. and Israel). The evidence for Russians' abilities to play in this market is demonstrated in the performance of Russians who have come to the U.S., including many in Silicon Valley and some in the Boston area, and even more dramatically in Israel, where Jewish Russians have helped fuel the Israeli Information Revolution.

President Putin has said that his number one problem is to restore Russia's economy and that the only way to do that is to join the global economy. Indeed, in his state of the nation address in July 2000, he said "We have no right to miss out on the information revolution which is now gaining momentum in the world." Facilitating Russia's rise in the global information economy is a significant element of this program. Such a step would be good not only for the economy, but also for the freedom of the citizenry since such a step will require the society to be open to the information that is available on the Internet and thus free to access such information. It will also require playing by the rules of the global information industry, including transparency and predictability – which are major steps down the road to the rule of law. To paraphrase an insight by one of the U.S.'s leading strategists, Albert Wolstetter, "the Net will make you free."

In 2000-2001 academic year, SDI mobilized its contacts in the U.S. information industry and began collaboration with key Russian leaders, such as the prominent parliamentarian and long-

time SDI friend Andrei Kokoshin, to help Russia capitalize on its underutilized mathematical and technical prowess to become a leader in the global information economy. The Russian Information Revolution Program tracked developments and trends in the software and technology sectors in Russia and produced bimonthly Russian Information Revolution Press Packets which track events and trends in E-governance, E-Commerce, the Internet, Software development, and Telecommunications in Russia.

As part of the fourth annual U.S.-Russian Investment Symposium, the Russian Information Revolution Program included a panel on “Development of the Internet: The Information Revolution and Russia.” Moderated by David Mixer, Managing Director of Rex Capital and Viktor Mayer-Schoenberger, Assistant Professor of Public Policy at the Kennedy School, the panel represented a cross-section of internet entrepreneurs and investors involved in the Russian market. The panelists included: Pavel Cherkashin, President, Actis Systems Corporation; Igor Belov, Argumenti I Fakti, Internet Project; Charles Ryan, Chairman, ru-Net Holdings Ltd.; Steve Roy, President, I Group Boston; Ron Lewin, Managing Director, TerraLink; Salavat Rezaev, Vesta Eurasia, and Brian Phelps, CEO, Vested Development, Inc. The panelists discussed the unique situation in internet development in Russia where the growth rates in almost every sector of Internet related businesses are rising 2 to 3 times faster than those in the U.S. (albeit from a much smaller baseline). The panelists’ presentations and the discussion that ensued identified the great potential of this sector as well as the numerous remaining obstacles to its development.

VI. THE MOSCOW TELECOMMUNICATIONS PROJECT

In the chaotic environment of Moscow, face-to-face meetings- or the nearest equivalent thereof – are one of the few ways that people keep on track. The main objective of the Moscow Telecommunications Project is to establish a videolink that makes possible regular videoconferencing between senior officials in Russia and experts at the Belfer Center for Science and International Affairs and the wider Harvard and Boston communities so that they may consult on issues pertaining to politics, business, economics, and international security. The Project is funded by a generous gift from Dr. Frank Stanton from the Ruth and Frank Stanton Fund of the New York Community Trust.

MEMBERS’ ACTIVITIES

Graham Allison Director of the Strengthening Democratic Institutions Project, continued to play an active role in the Project’s Russian democratization efforts, Caspian Studies Program, and the Russian Investment Symposium.

Throughout the course of the 2000-2001 academic year, Allison, BCSIA Executive Director John Reppert, and SDI Fellow Vladimir Boxer worked to engage new leaders from Russia and the U.S. in the Russian Investment Symposium. During multiple trips to Russia, Allison, Reppert, and Boxer worked closely with German Gref, Minister for Economic Development and Trade, as he and his team developed Russia’s new economic program.

Graham Allison co-authored many of the editorial leaders and some additional articles in SDI's flagship publication *Russia Watch*. Allison had many publications in the past year, including op-eds on Russia's crisis with the Kursk submarine, Russian nuclear security, U.S.-Russian relations, and a response to representative Cox's report on the Clinton administration's Russia policy in the *Boston Globe*, the *Los Angeles Times*, and the *International Herald Tribune*.

As Chairman of the Caspian Studies Program, Allison participated in the annual U.S.-Azerbaijan Chamber of Commerce conference in September; conducted one-on-one briefings and discussions with members of the Executive and Legislative branches this past year; led his course of graduate students in an exploration of Caspian pipeline politics and the relations between business and government; and participated in Program conferences and seminars.

Kazim Azimov is a Professor at Baku State University's Sociology Department and was a visiting Caspian Studies Program Associate from April to July 2001 under the Junior Faculty Development Program. Dr. Azimov, whose current focus is comparative ethnic conflict studies, focused his research at the Caspian Studies Program on the internal and external dimensions of ethnic conflict in the Caucasus.

Vladimir Boxer has been a Fellow with the Strengthening Democratic Institutions Project since 1997. He was initially trained as a pediatric gastroenterologist and earned his M.D. from the Russian State Medical University in Moscow in 1977. In 1988 Vladimir became active in the Russian pro-democratic movement. From 1990-1993 he was the Executive Director of "Democratic Russia" – the leading umbrella democratic movement. Beginning in 1990, he held a number of positions including: co-chairman of the "Democratic Russia" faction in the Moscow City Council; Chief of the Apparatus of the Mayor of Moscow; Vice-Chairman of the Moscow City Assembly; Assistant to Yegor Gaidar, the Chairman of the "Russia's Choice" faction in the Russian State Duma; and Executive Director of the Moscow Division of "Russia's Democratic Choice." At SDI, Vladimir conducts research on democratization and elections in Russia. He is involved in organizing the Investment Symposiums and has worked to engage new leaders from Russia in SDI's events, publications, and research. In 2000-2001, Boxer traveled to Russia to help organize the Investment Symposium; gave presentations on Russia's domestic political and economic situation at conferences in the U.S. and Russia; and both authored articles and consulted on the overall content of SDI's *Russia Watch* publication.

Melissa Carr is the Project Coordinator of the Strengthening Democratic Institutions Project and the Program Director of the Caspian Studies Program. She manages the personnel, programs, publications, budgets, and daily operations of the Strengthening Democratic Institutions Project and maintains donor relations. Melissa also directs the Deepening Russia's Democracy seminar series, the Caspian Studies Program seminar series, and policy outreach activities. In addition, in 2000-2001, Melissa traveled to Azerbaijan to interview officials, executives, and leaders from the public and private sectors for admission and fellowships for the Kennedy School's degree and Executive Programs and delivered a paper on "U.S. Policy and Interests in the Caspian Region" to an East/West Institute Conference on Black Sea Regional Security which was held in Baku and attended by government representatives and academics from six countries of the region. Melissa joined SDI in 1999. Before coming to SDI, she received her MPA with a focus on International Development from the Woodrow Wilson School at Princeton University and

spent six years in the countries of the former Soviet Union directing offices and programs for Project Harmony, an international development and cultural and educational exchange organization.

Maury Devine is the former President and Managing Director of Mobil (now ExxonMobil) in Norway and is currently a Fellow in the Caspian Studies Program. Her research focuses on lessons learned from oil and gas development in Norway and their application to the Caspian region, particularly Azerbaijan and Kazakhstan. She has contributed to the recent CSP case study "U.S. Policy on Caspian Energy Development and Exports - May 2001" and other publications and is currently working on a paper on a staged approach to the Baku-Tbilisi-Ceyhan pipeline. In addition she is examining how the lessons learned from the Norwegian oil experience relate to the Caspian countries' fiscal regimes, pace of development, move toward privatization and particularly the countries' Petroleum Funds.

Ben Dunlap is a Research Assistant at the Strengthening Democratic Institutions Project (SDI). He conducts research on Russian politics and U.S.-Russian relations and serves as the editor and writer of *Russia Watch*, SDI's bimonthly bulletin providing analysis and commentary on Russian politics. In the past year Dunlap has been SDI's lead researcher on Russia's democratic transformation and has focused particular attention on freedom of the press in Russia. Dunlap has also worked with the Belfer Center Director Graham Allison on research and writing projects on such topics as globalization, America's foreign policy role in the 21st century, and nuclear security. He supervises the work of two Research Assistants conducting research on international affairs for Professor Allison. Dunlap joined SDI in 1998, after earning his A.M. in Russian Area Studies at Harvard University. He received his B.A. in Russian from Bates College in 1994. Dunlap spent two years teaching English in Russia's Komi Republic, has made numerous visits to Russia, and is fluent in Russian.

Emily Goodhue is the Staff Assistant for the Strengthening Democratic Institutions Project and Caspian Studies Program, providing administrative support and assisting in the day-to-day operations. She assists in conference and seminar planning for such conferences as the October CSP event entitled "U.S.- Russian Relations: Implications for the Caspian Region," and the very active Caspian Studies Program Seminar Series. She also assists in the production and distribution of the many publications produced by the program, which involves maintaining the contacts database. Emily joined the SDI Project two years ago after receiving a B.A. in Russian Studies from Wheaton College in Norton, Massachusetts.

Pamela Jewett is an Associate with the Strengthening Democratic Institutions Project. Pam joined SDI in 1993 as a Research Associate after earning her A.M. in Russian Area Studies from Harvard. In 1992, while a Master's degree candidate she was a member of the Working Group for SDI's Trilateral Study on US-Japanese-Russian relations and researched and authored a chapter of the Study's final report on key documents related to the territorial dispute between Japan and Russia over the Kuril Islands. At SDI, she was co-author with Fiona Hill of two reports: "Report on Ethnic Conflict In the Russian Federation and Transcaucasia" (1993) and "Back in the USSR: Russia's Intervention in the Internal Affairs of the Former Soviet Republics and the Implications for United States Policy Toward Russia," (1994). Since 1995, Pam has been an Associate of the SDI Project. She has been responsible for preparing and editing transcripts

from SDI's conferences and seminars, and for summarizing the proceedings and writing the text for the final reports for Harvard's annual U.S.-Russian Investment Symposia in 1999 and 2000. She also prepares financial reports for the SDI project and its donors.

Mitchell A. Orenstein joined the SDI Project as a Fellow in Spring 2001. Orenstein is on leave from his position as Assistant Professor at the Maxwell School of Syracuse University. In Fall 2000, Orenstein served in Moscow as lead faculty member in a new university partnership program between the Maxwell School and the Moscow State University School of Public Administration. Sponsored by the US State Department, this partnership aims to strengthen university-level public administration education in Russia.

Orenstein's research focuses on the political economy of globalization, postcommunist transition, and democratic theory. He is the author of *Out of the Red: Building Capitalism and Democracy in Postcommunist Europe* (University of Michigan Press, 2001) and numerous other publications on postcommunist privatization, labor relations, and social policy, including a World Bank Policy Research Working Paper, "How Politics and Institutions Affect Pension Reform in Three Postcommunist Countries." At SDI, Orenstein is developing this paper into a book on *Global Policy and Democratic Deliberation: The Rise of the New Pension Reform*. This book examines the development and dissemination of a new global pension reform model that strikes at the heart of the old post-war social contract. The book compares the implementation of this model in two more-democratic (Poland/Hungary) and two less-democratic (Russia/Kazakhstan) postcommunist countries, to evaluate the impact of democracy on policies formulated at the global level. Orenstein's work is funded by grants from the American Council of Learned Societies and the John D. and Catherine T. MacArthur Foundation. He is also working with the Deepening Russia's Democracy initiative at SDI to reconceptualize the next stage of postcommunist democracy assistance.

David Rekhviashvili is a Researcher at the Strengthening Democratic Institutions Project where he conducts research on Russian politics and US-Russian relations. He also conducts research for the Caspian Studies program. He graduated from the Faculty of Law of the International University, Moscow, where he received Degrees of Bachelor and Specialist of Laws and currently is a Ph. D. candidate in International Law. In the Spring of 2001 Rekhviashvili was accepted to the MPP program at the Kennedy School of Government. He intends to collaborate closely with SDI while pursuing his studies. Previously, he worked as a Program Officer Assistant in The Moscow Institute of Social and Political Studies for two years. He was awarded a Russian Presidential Scholarship to study abroad in the years 2000 and 2001. Rekhviashvili was responsible for tracking information in mass media and researching Russian politics, economy, US-Russian relations and Russia's policies in the Southern Caucasus. He provided research and was a co-writer of the news/ analysis section of SDI's *Russia Watch* bulletin, a bimonthly publication providing analysis and commentary on Russian politics. Also, Rekhviashvili frequently wrote event summaries for web posting.

Peter Rutland is a Fellow with the Caspian Studies Program and a Professor of Government at Wesleyan University. This year he researched the political economy of the Russian energy sector and edited annual survey articles on all the countries in the Caspian region for *Transitions Online*. He is continuing to explore the geopolitical dynamics of the Caspian region, especially

the Russian dimension that has emerged as increasingly significant given the war in the Caucasus and the arrival of a new vigorous Russian President who promises to be more assertive and pragmatic.

Brenda Shaffer serves as Research Director of the Caspian Studies Program and is an International Security Program post-doctoral fellow. Dr. Shaffer's research concentrates on the Caucasus, Central Asia, Iran, Russian-Iranian relations, and theoretical issues of collective identity. She published a number of works this year, including a book entitled *Partners in Need: The Strategic Relationship of Russia and Iran* (Washington Institute for Near East Policy, 2001); a number of op-eds, which appeared in major newspapers, among them *The International Herald Tribune*, *The Boston Globe*, and *The Miami Herald*. She prepared a book manuscript on identity and politics of the Azerbaijanis which will be published this fall as part of the BCSIA's Studies in International Security at MIT Press. Dr. Shaffer is working on an edited volume on *Culture and Foreign Policy: Islam and the Caspian*, which will be published in spring 2002, also in this series. Under Brenda's leadership, the Caspian Studies Program launched a policy brief series, and produced a number of major publications, including a Caspian region sourcebook. Among the briefs, Brenda authored, "U.S. Policy Toward the Caspian Region: Recommendations for the Bush Administration." Brenda gave a number of briefings and lectures at government forums, including at the State Department, National Defense University, NATO, and for the Azerbaijani Foreign Ministry, and her article, "It's Not About Ancient Hatreds, it's about Current Policies: Islam and stability in the Caucasus," was incorporated in the U.S. Department of Defense's source materials. She spoke frequently at international conferences on the Nagorno-Karabagh conflict and security issues in the Caucasus, including giving the keynote speech at the workshop, "Stability and Peace in the Caucasus: The Case of Nagorno-Karabakh," in May in Loccum, Germany. Brenda planned a number of events, including the April seminar with Ambassador Carey Cavanaugh, "Negotiations on Nagorno-Karabagh: Where Do We Go From Here?" and a conference on energy security co-sponsored with ISP and the German Council on Foreign Relations. She gave a large number of media interviews, commenting on the Caucasus, Iran, U.S. policy toward the Caspian region, including a number of times for the BBC, Voice of America, and newspapers in Azerbaijan and Turkey. Dr. Shaffer served this year on a number of research grant committees, including for IREX.

Emily Van Buskirk, a Research Assistant for the Strengthening Democratic Institutions Project and the Caspian Studies Program since October 1999, graduated from Princeton University in 1997, receiving an A.B. in Slavic Languages and Literatures and a certificate in Russian Studies. She subsequently taught for a semester in Kazakhstan as a Princeton-in-Asia intern and then was awarded a Fulbright scholarship to study at Charles University in Prague. She conducts research on Russian politics, democratization, U.S.-Russian relations, Caspian energy development and transports, relations among Caspian Basin states, and relations between Caspian states and the U.S. During the past year, she compiled a 1000-page volume of primary documents known as the *Sourcebook for the Caspian Region* (with Roman Ilto and Brenda Shaffer), contributed to the editing and publishing of numerous Caspian Studies Program publications (including policy briefs, working papers, and conference reports), and co-authored a mini-case and paradigm with Graham Allison entitled *U.S. Policy on Caspian Energy Development and Exports* (for use in the Kennedy School course "Central Issues of American Foreign Policy"). She also edited the Russian Commentaries section of *Russia Watch* and wrote articles about Caspian Studies

Program events and activities for the Kennedy School *Update*, BCSIA *News*, *Azerbaijan International*, and the USACC *Annual Report*. She is responsible for maintaining and designing the Strengthening Democratic Institutions and Caspian Studies Program web sites, writes event summaries for web posting and publication, and edits the Caspian Studies Program *Newsletter*.

Stefan Zhurek, Executive Director of Moscow Initiatives, focuses on the Investment Symposium and the Moscow Telecommunications Project. He holds a Ph.D. in International Economics (1998) from Moscow State University and was the recipient of an SSRC-MacArthur Postdoctoral Fellowship on Peace and Security in a Changing World from 1993-1995. Since 1998, he has also held fellowships at Birmingham and Heriot-Watt Universities in the United Kingdom, at Harvard's Davis Center for Russian Studies, and the University of California at Berkeley. Based in Moscow, Stefan was involved in coordinating the Russian side of the Fourth annual U.S.-Russian Investment Symposium.

PUBLICATIONS

To review publications of the Strengthening Democratic Institutions Project and its members, see page 237.

EVENTS

To review events of the Strengthening Democratic Institutions Project and its members, see page 213.

WPF Program on Intrastate Conflict, Conflict Prevention, and Conflict Resolution

MEMBERS

Robert I. Rotberg, Director
Sharon Butler, Program Manager
Heidi Panetta, Program Manager
Deborah Weinberg, Program Associate
Alexis Keogh, Research Assistant
Clive Gray, Director of Project EAGER and Senior Fellow
Malcolm McPherson, Fellow in Development
Clifford Zinnes, Fellow in Development

BACKGROUND

On July 1, 1999, the WPF Program on Intrastate Conflict, Conflict Prevention, and Conflict Resolution was established in the Belfer Center of the Kennedy School as a result of an association between the Center and the World Peace Foundation. The Program analyzes the causes of ethnic, religious, and other intercommunal conflict, and seeks to identify practical ways to prevent and limit such conflict. It is concerned with the consequences of the global proliferation of small arms, with the vulnerability of weak states, with peace building and peace enforcement capabilities in Africa, and with the role of truth commissions in conflict prevention and conflict resolution.

RESEARCH AGENDA AND POLICY OUTREACH

CHALLENGES TO PEACE IN THE NEW MILLENNIUM

Establishing world order is no easier at the beginning of a new century than it was at the onset of the old. But in this era, the peace of the world is threatened by instabilities within nations much more than by disturbances between competing empires or power blocs. It is the low-tech wars that kill. Intercommunal hostilities fuel those conflicts, and sometimes become massacres and genocides. Perceived ethnic differences, religious differences, linguistic differences, racial differences, class differences, and access to resource differences, plus the real or imagined fears that sometimes arise from those differences, all stoke the flames of twenty-first century mayhem.

During the last decade of the old century an estimated 7 million persons were killed in those little wars – the civil wars and civil insurgencies of modern times. The big wars are artifacts of big power rivalries that, thankfully, are past. Even potentially dangerous threats from

intercontinental nuclear ballistic missiles have been contained and major multinational cross-border conflagrations avoided in Asia and Europe. Only Africa has witnessed a hot war – admittedly a rather pointless if deadly one – across what once was an internal border.

Interneccine conflicts preoccupy policy makers and everyone concerned with the creation of a more peaceful world. Indeed, the civil wars of the late twentieth century were the dangerous hot wars of the era: Algeria, Chechnya, Bosnia, Kosovo, Sri Lanka, Angola, Burundi, the Congo, Rwanda, the Sudan, Sierra Leone, and Liberia – to name but the more brutal – were the killing fields of the last years of the old century and have become the continuing concerns of the new.

How to end the implacable conflicts, like those in Burundi, the Sudan, and Sri Lanka, and how to prevent the emergence of new intrastate hostilities, is a compelling objective of the WPF Program on Intrastate Conflict. It studies conflict prevention and conflict resolution, both in general and with regard to particular civil wars, and attempts to create conditions or policy frameworks conducive to peacemaking and peace maintenance across the globe and in troubled theaters of violence.

The WPF Program is also concerned with limiting the weapons of choice of civil wars and intrastate mayhem: it seeks to reduce the spread of small arms by making the legal export trade more transparent and the illicit trade in those weapons easier to prevent and pursue. The WPF Program has examined methods of preventive diplomacy and early warning. It has worked with the military establishments of Africa to construct early action crisis response capabilities to meet the challenges of conflict prevention. It has analyzed how best to negotiate the end of deadly intrastate conflicts. It continues to be engaged directly in the resolution of one long-standing intrastate antagonism through facilitated dialogue and mediation. Although world order remains elusive as ever, the WPF Program continues to seek solutions to the main threats to global harmony.

PROMOTING PEACE WITHIN TROUBLED STATES: 2000–2001

In the past year, the WPF Program engaged in the following major endeavors:

UN Peacekeeping

Last year's report on United Nations Peace Operations began with a somber statement: "Over the last decade, the United Nations has repeatedly failed to meet the challenge" of protecting people from war. The report, compiled by a panel of experts from all six continents and chaired by Lakhdar Brahimi, a former Algerian Foreign Minister, proposed extensive reforms of UN Peacekeeping operations. Since the report, the UN has struggled to build peace in Sierra Leone and the Congo. The UN may or may not be capable of peace enforcement and peace building, but it is the only major provider.

How best to make peace in conflict issuance of the region is a central question for the WPF Program, which hosted a meeting of UN officials, peace practitioners, and academics at the Kennedy School of Government on May 4-5, entitled "Peacekeeping and Peace Building: Building on the Brahimi Report." The meeting explored all aspects of the peacemaking process,

particularly the inability of the UN effectively to prevent conflict and build peace in the developing world.

Robert I. Rotberg, J. Brian Atwood, former Administrator of AID and a member of the Brahimi Commission, chaired the meeting. Iqbal Riza, Chef de Cabinet of the UN Secretary-General, opened the off-the-record discussion. Other participants included Derek Boothby, Yves Doutriaux, Michel Duval, and Stewart Eldon of the UN; Nancy Soderberg of the International Crisis Group; Colin Granderson, a UN representative and member of the Brahimi Commission; Sir Marrack Goulding, former Undersecretary General of the UN; Cameron Hume, Robert Orr, and Donald Steinberg of the US government; Jonathan Moore of the KSG; and Page Fortna of Columbia University.

Failed States

The last decades of the twentieth century have experienced wholesale examples of state weakness, especially in Africa. Liberia, Sierra Leone, and Somalia – to cite but three of many cases where states have ceased for at least a time to function as states – are examples of collapsing or collapsed states. Others, not least in Central Asia, Southeast Asia, and Africa, are vulnerable. This project searches for effective guidelines on how best to restore states that have ceased to function well, and on how to prevent states (like the Democratic Republic of the Congo) from cascading into failure. This project is about reinvigorating and rejuvenating states. It is also about understanding why and how they stumble, and sometimes seem to collapse. The project also asks whether some states should not be resurrected. Letting states fail sometimes could be wise policy.

Revitalizing states is much more difficult than preventing them from sliding toward decay and collapse. It is important to establish indicators of decay, and of rates of decay. It is important to determine the relative importance of such indicators: Which two or three (or seven) weaknesses generate the likelihood of collapse, and on what time scale? Likewise, to reverse the process of decay, which are the most critical, secondary, and tertiary factors? Security? Restoring the rule of law? Resuscitating the macroeconomy? Reestablishing local government? Other political institutions? Empowering civil society? Sustaining international commitments?

Who restores? Who helps resuscitate? What are the most important international and regional actors? Who manages the process? What roles should which parts of the UN play? What can and should global and regional powers do to help prevent state collapse? What international policy changes should be proposed? If globalism and the macroeconomic realities of the twenty-first century have made weak states more vulnerable, what should be done to help the weaker states? Those are among the key questions for this project.

The WPF Program involves scholars and practitioners from the United States, Europe, Africa, and elsewhere in answering these and other questions. The intent is to provide both practical and conceptual understanding to practitioners and scholars, and also to advance the field of conflict prevention and conflict avoidance by reaching testable propositions about vulnerable states.

The main fields of interest include: state collapse in theory and history; indicators of state vulnerability: political indicators of state vulnerability: economic; vulnerability and stability: the

context of decay; very early conflict prevention techniques; small arms and light weapons; the military in collapse and resuscitation; rebel movements; ending civil wars; demobilizing combatants; recreating political institutions; recreating economic functioning; devising electoral and other confirming mechanisms; reestablishing the rule of law; managing the process of revitalization; empowering civil society; and the role of the UN and regional organizations.

An initial meeting to discuss the contours of this project took place in early 1999 in Britain, with the collaboration the Centre for Defence Studies, King's College, London, and welcome support from the Foreign and Commonwealth Office. Subsequently, the project was reconfigured and reorganized. An initial authors' meeting took place in June, 2000 at the Kennedy School of Government. A second meeting took place in January, 2001, and a third in June, 2001. A series of volumes is being edited.

Cyprus

In 1998, building upon the lessons examined in its *Mediating Deadly Conflict: Lessons from Afghanistan, Burundi, Cyprus, Ethiopia, Haiti, Israel/Palestine, Liberia, Sierra Leone, and Sri Lanka*, WPF Report 19 (Cambridge, Mass., 1998), the WPF Program began to seek solutions capable of breaking the long impasse that had left the two linguistic and religious communities of Cyprus divided since the 1960s. Although about 82 percent of Cypriots are of Greek Cypriot descent and 17 percent of Turkish Cypriot or Turkish ancestry, since the 1974 war Turkish Cypriots have controlled about 36 percent of the island and Greek Cypriots the remainder. Since 1974, UN troops have patrolled a partition line dividing the northern (Turkish Cypriot) and southern (Greek Cypriot) sectors of the island.

Although bicomunal contacts were suspended by the Turkish Cypriot side in 1997, The WPF Program agreed to engage in track 2 diplomacy by bringing together Turkish Cypriot and Greek Cypriot political, business, labor, and academic leaders. Joined by the UN special advisor, a former American governor, a former US coordinator for Cyprus, an American general, and a clutch of American negotiators, diplomats, and academics, the Cypriots met initially in New Hampshire in mid-1988. Robert I. Rotberg's account of the Cyprus problem and the meeting, together with Ericka Albaugh's summary of the discussions in New Hampshire, appeared in 1998 as *Cyprus 2000: Divided or Federal?*, WPF Report 20.

Cyprus 2000 was well-received on the island, and elsewhere. Its positive reception was important, especially because it reflected a mutual Turkish Cypriot and Greek Cypriot desire to meet not episodically but consistently and regularly in a disciplined track 2 negotiating forum. After follow-up visits to Cyprus by The WPF Program's Director and detailed discussions with leading official and unofficial Turkish Cypriots and Greek Cypriots, plus UN and other senior diplomats, The WPF Program gathered together a carefully-selected matched group of high level Greek Cypriots and Turkish Cypriots. In meetings every two months throughout 1999 and into the first half of 2000, this track 2 (or track 1.5 given the prominence of the members of the group) experience of shared negotiating responsibility led to a series of interim reports (privately available on the island and elsewhere) and direct contributions of ideas and language to the official, 1999-2000 UN-sponsored track 1 proximity talks with the Presidents of the Republic of Cyprus and the Turkish Republic of North Cyprus.

Ultimately, the track 2 efforts led to a detailed new set of negotiating ideas and options. They included a blueprint for the organization and functioning of a new United States of Cyprus (USC), with two constituent entities of equal political weight and power. The USC government's powers and responsibilities would relate to international law and to minimum standards, regulation, and multilevel legislative coordination. USC government competencies would include citizenship, passports, and immigration; conduct of foreign affairs; island-wide defense (subject to security guarantees); policing of USC activities and property; coastguard and fisheries; customs; central banking and currency; monetary policy; economic growth policy; USC budgets and taxation; postage and posts; environmental issues; energy; natural resources; telecommunications policy; open registries and shipping; civil aviation; common heritage coordination; and archives. The two entities would have the power to act and regulate in all areas not given explicitly to the USC government. The WPF Program's work with Turkish and Greek Cypriots continued throughout 2001 and beyond.

Peace Enforcement in Africa

Modern Africa is engulfed in war. Nearly all of those wars are within states, where rivalries that play themselves out ethnically have been the curse of Africa since independence in the 1960s. How to prevent such intrastate conflict was the concern of this project. Specifically, this project focused on conflict prevention through intervention and peace enforcement by African commanded sub-regional crisis response forces. Africans can respond appropriately to their own crises and need not rely on outside interpositioning between combatants. Africans can, the project concludes, take charge of reducing their own intrastate warfare.

Since future Congos and Rwandas are unlikely to be rare, and since Burundi is a continuing calamity, an overriding issue for both Africa and the West has been how to restore and keep the peace. The motives for doing so are obvious: to save lives and boost the possibility of economic development; to achieve a greater than present prosperity for Africans and Africa. The absence of civil war would encourage national and continental opportunities for growth. Human and economic potentials would be unlocked after years, if not decades (in some cases), of destruction.

Africans can take charge of their own conflict prevention and peace enforcement. For decades, contingents from a number of African countries, especially Ghana, Senegal, and Botswana, have been deployed in UN peacekeeping operations, outside as well as within Africa. They have served in South Lebanon, Somalia, Angola, and elsewhere. But peacekeeping occurs after a brokered cease-fire is in place. Peacekeepers observe violations of cease-fires and seek to reduce other breaches of the peace.

Africa's problems are primarily of the pre-cessate-fire kind. How to persuade or compel warring parties to lay down their arms and resolve conflicts peacefully is the overriding question. Thus, if a rapid reaction force of African soldiers could be created to make the peace, and to minimize the spread of hostilities, fewer lives would be lost and fewer internecine antagonisms would transform themselves into all-out civil wars. At least that is the hypothesis that motivated this project to explore how an African-controlled force could be used to prevent conflict and strengthen the pursuit of peace on the continent.

Africans have long recognized the great need for conflict prevention and appropriate military intervention on their continent. Some of their savvy statesmen have oft sought to reduce threats to peace and have employed the usual concatenation of diplomatic means to limit the spread of internecine imbroglios. The Organization of African Unity (OAU) in theory exists to perform just such roles, but unanimity of decision making hinders any decisive action, as does the inviolable doctrine of non-interference in sovereign states. Moreover, the OAU has had no effective early warning or early action capacity; nor has it had any military capability. Only when Tanzania ousted Idi Amin from Uganda in 1979 and when a frustrated Economic Community of West African States (ECOWAS) formed the expeditionary force known as ECOMOG to intervene in Liberia, and later in Sierra Leone, did Africa exhibit any broad willingness to limit the killing fields of the continent.

Do Africans want to keep their own peace by developing peace intervention and peace enforcement capacity? If the strong recent responses to these and similar questions by a prime minister, about twenty ministers of defense, and about thirty chiefs of staff and their deputies, are at all representative, then the answer to each question clearly is affirmative. During the course of three large meetings (1997-1999) in the United States, Malawi, and Tanzania, military and political leaders from as many as fifteen African states appeared ready to embrace the notion that collective African controlled peace intervention methods were desirable, even possible. Western financial and other support would be essential. Western direct logistical assistance would be critical. Those who attended the three meetings also decided that Africa was a continent of sub-regions, and that the crisis response forces should be organized roughly along sub-regional lines. That is, instead of a single, continental army of questionable quality, there should be four or five sub-regional crisis reaction forces, each with its own mandate, derived from the nations it would serve.

There is broad agreement about the utility of such forces. Raising them through secondments from existing operational military units would not be difficult. Choosing commanders would not prove a stumbling block; indeed, the African military leaders at The WPF Program-sponsored meetings were sanguine about battalions from disparate countries working easily together for the common cause of sub-regional peace. The problem was not technical or professional. It was distinctly political.

The difficult questions are all political. Which crises merit the attention and intervention of a sub-regional force? Are they to be restricted to the Lesotho-type scenarios, where the elected government of Prime Minister Pakalitha Mosisili was threatened by mutinous soldiers and defeated politicians, perhaps in league with the local monarch? Or could a force of the kind contemplated have been used to impose peace on Somalia, prevent genocide in Rwanda, and reduce the threat of a rebellion in the Congo? Those models of larger crises would, in retrospect, have been desirable settings for such peace enforcement strategies. In theory, a rapidly mobilizable multinational brigade could have dampened those conflicts, obviating deaths, misery, and spreading instability. With the will of Africa behind it, such a force could have disarmed the feuding Somalis before the warlords gained strength, prevented the Hutu Interahamwe from rounding up and then massacring Tutsi in the first month of the genocide, and separated the warring sides in Congo early enough to have made a peaceful difference.

The thorny questions of when and where to intervene also raise the critical question of who decides? How does the peace enforcement operation commence? Whose fingers are on the trigger of intervention? Who summons the SADC, the East African, or the ECOWAS force together? Who tells the commander of one of the forces to mobilize his multinational troops? The same mechanism, organization, or person who recognizes an incipient or actual conflagration within a state (or between states) as worthy of peace intervention also calls in the previously arranged response: the sub-regional brigade. But what or who could do it?

If not the OAU, perhaps decisions of the kinds contemplated could be devolved to the sub-regions. Not all the sub-regions have working forums, like SADC and ECOWAS. In the Great Lakes or the Horn there is too little cohesion and sense of common purpose. In southern Africa, in theory, there is both the will and modalities sufficient to bring about the decision-making processes that will be necessary. But that depends entirely on the pleasure of South Africa, SADC's largest and wealthiest member and its natural leader. South Africa already acts directly when it needs to, as in Lesotho. It has chosen not to exercise any military might in Angola, Congo, or even Burundi (despite talk of doing so and a keen diplomatic involvement in all three zones of conflict).

It is not as yet evident that there exists either the capacity to make such decisions multilaterally in Africa, or to have them taken by individuals for the common good. President Robert Mugabe of Zimbabwe was decisive regarding Congo, and intervened on behalf of President Kabila. But no state, not even Namibia and Angola, which also took Kabila's side, let Mugabe's decision substitute for its own judgment. Indeed, President Nelson Mandela of South Africa opposed Mugabe's lead, and said so. Former President Nyerere of Tanzania telephoned Mugabe with a similar message – but to no avail. Likewise, in ECOMOG, President Sani Abacha of Nigeria ultimately made the decisions, not always with the support of his fellow West African presidents, or to their liking.

Until the time when an African capacity for making these kinds of decisions is fully developed, a crisis response force for Africa could conceivably be mobilized by the Secretary-General of the United Nations. His or her stature and impartiality would be recognized widely in Africa, whether or not the incumbent were an African. The Secretary-General would have access to early warning information (currently collected by the UN Department of Peacekeeping Operations) and be privy to the concerns of the OAU and sub-regional organizations. He/she might even gain access to the intelligence on such matters of individual powers. A Secretary-General could, in theory, be perfectly placed to decide when to pull an interventionist trigger. But the Secretary-General works for the UN and for the Security Council. In the Rwandan crisis of 1994, the Security Council prevented action by representatives of the Secretary-General until it was too late. In the Congo, and elsewhere, the mandate of the Secretary-General was ignored. The UN usually respects the sovereignty of its members, despite the possibilities provided by Chapter 7 of the Charter.

There is no perfect, no realistic, decision-making apparatus around which the participants in The WPF Program meetings were prepared to rally. The instrument of the Secretary-General of the UN seemed the best possibility, despite its obvious structural flaws. Certainly, as far as the participants were concerned, no African individual or organizational modality offered any higher

decision-making ability.

A report of this project is contained in: Robert I. Rotberg and Ericka A. Albaugh, *Preventing Conflict in Africa: Possibilities of Peace Enforcement*, WPF Report 24 (1999). The book, *Peacekeeping and Peace Enforcement in Africa: Methods of Conflict Prevention*, with chapters by Happyton Bonyongwe, Christopher Clapham, Herbst, Steven Metz, Rotberg, and others appeared in late 2000.

Truth Commissions

In its continuing effort to scrutinize the implications of all aspects of the truth commission model, The WPF Program asked Dennis Thompson and Robert I. Rotberg to bring together in a book the fresh thoughts of political philosophers, jurists, lawyers, theologians, and sociologists about the moral efficacy and practical utility of truth commissions. The book's draft chapters were then discussed at a meeting in South Africa with the commissioners and staff of that country's Truth and Reconciliation Commission, the latest, most encompassing, and most public of all truth commissions. Additional book chapters emerged from those discussions. The result, edited by Rotberg and Thompson, appeared in late 2000 as *Truth v. Justice: The Morality of Truth Commissions* (Princeton University Press).

To celebrate the book's publication, the WPF Program hosted a Truth Commissions forum at the Kennedy School on October 11, 2000. At the forum, entitled "Truth Commissions: The Relevance of the Truth Commission Method to Resolving Situations of Extreme Conflict," Michael Ignatieff, Carr Visiting Professor of Human Rights Practice, suggested that "impermissible lies" prevent societies emerging from extreme conflict from healing their wounds and moving forward. His fellow lead panelists at the forum were Divinity School Dean Bryan Hehir, who emphasized the importance of "prudential" moral judgments in assessing the utility of the truth commission method, and Law School and Kennedy School Professor Philip Heymann, who suggested that truth commissions were a cost-effective way of achieving closure after episodes of state-dividing conflict. Three respondents added to the lively debate. Law School Professor Martha Minow argued that truth commissions not only can but must provide a contextual armature for rebuilding shattered states, communities, families, and individuals. Charles Maier, Director of the Center for European Studies, reminded the panel of the historic perspective, that "restorative justice does not restore to what was, but that it is possible to make quantitative judgements and find common ground." David Crocker, Senior Research Scholar at the University of Maryland, spoke on the value of punishment, of negative sanctions for immoral behavior, and concluded with the thought that "transitional justice is yet another area where we're seeking global assessment for the unassessable."

World Faiths Development Dialogue

Faith networks can assist international lending agencies and bilateral donors in addressing questions of development and poverty alleviation in the poorest countries of the world. That is the working hypothesis of an initiative encouraged by President James Wolfensohn of the World Bank, the Archbishop of Canterbury, and H. H. the Aga Khan.

The WPF Program worked with the trustees of the new endeavor and with the managing director of the newly launched Center for Faiths Development in Britain to facilitate a series of preliminary dialogues about target countries (from Albania to Tajikistan) and with experts on Hinduism, Buddhism, Islam, Christian Orthodoxy, and African religions. In March, five panels on faith questions and faith and development met in brainstorming sessions at the KSG. Each produced sets of guidelines for the new Dialogue. Earlier, teams of researchers had prepared country briefing papers, focusing on the interplay of development and religion.

PROJECT EAGER

On July 1, 2000, Project EAGER (Equity and Growth through Economic Research), a \$5-million USAID-funded program of policy research in Africa, transferred to the WPF Program on Intrastate Conflict from the former Harvard Institute for International Development (HIID). HIID had been running one of two streams of EAGER, Public Strategies for Growth and Equity, since 1995. The project ends in 2001. It has involved twenty separate studies in ten African countries. The largest component is a multi-theme study on Restarting and Sustaining Economic Growth and Development in Africa, which includes country studies by local research teams in Ghana, Kenya, Senegal, Tanzania, and Uganda. Narrower themes, such as tax compliance, monetary programming, contracting procedures, microfinance, outsourcing to indigenous enterprises, and labor market reform have been studied by researchers from Harvard and eight other U.S. institutions - both universities and consulting firms - in tandem with African collaborators. An integral component of each study is a subsequent dissemination program, normally beginning with a workshop attended by policy makers, stakeholders, and researchers of the relevant country.

THE WPF PROGRAM'S WEB SITE

Information about the WPF Program can be located at www.ksg.harvard.edu/bcsia/wpf. Email reaches The WPF Program at world_peace@harvard.edu.

MEMBERS' ACTIVITIES

Robert I. Rotberg is Director, WPF Program on Intrastate Conflict, Conflict Prevention, and Conflict Resolution in the Belfer Center of the Kennedy School of Government, Harvard University, and President, World Peace Foundation. He was Professor of Political Science and History, MIT; Academic Vice President, Tufts University; and President, Lafayette College. He is a Presidential appointee to the Council of the National Endowment for the Humanities and a Trustee of Oberlin College. He is the author and editor of numerous books and articles on US foreign policy, Africa, Asia, and the Caribbean, most recently *Peacekeeping and Peace Enforcement in Africa: Methods of Conflict Prevention* (2000), *Truth v. Justice: The Morality of Truth Commissions* (2000), *Creating Peace in Sri Lanka: Civil War and Reconciliation* (1999), *Burma: Prospects for a Democratic Future* (1998), *War and Peace in Southern Africa: Crime, Drugs, Armies, and Trade* (1998), *Haiti Renewed: Political and Economic Prospects* (1997), *Vigilance and Vengeance: NGOs Preventing Ethnic Conflict in Divided Societies* (1996), *From Massacres to Genocide: The Media, Public Policy and Humanitarian Crises* (1996), and *The*

Founder: Cecil Rhodes and the Pursuit of Power (1988).

Sharon Butler was the Program Manager for the WPF Program on Intrastate Conflict, Conflict Prevention, and Conflict Resolution until June, 2001. Butler researched a thesis on “Immigration Policy Reform” in the United States Congress for Congressmen Bill Baker and Ed Royce before receiving her B.A. in History from Biola University in 1995. She served as the Legislative Assistant for the Minority Leader of the California State Assembly, during which time her primary policy focus was Education and Health and Human Services. Butler worked in electoral politics in southern California during the 1996 presidential election.

Heidi Kline Panetta became the Program Manager for the WPF Program on Intrastate Conflict in May, 2001. Panetta was last employed as a Policy Analyst with the U.S. Department of State, specializing in Africa. As a part of the U.S. Government's Presidential Management Intern (PMI) program, she completed rotational assignments at the Overseas Private Investment Corporation (OPIC) and the American Embassy in London. Panetta's overseas work experience also includes internships in Spain and Mali. She also has a background in management consulting. Panetta holds a Master's Degree from the Johns Hopkins University School of Advanced International Studies (SAIS), and a certificate in International Business Management from Georgetown University School of Business. She received her Bachelor's Degree in International Relations *magna cum laude* from The George Washington University.

Deborah Weinberg joined the WPF Program as a Program Associate in June, 1999. Prior to working at the BCSIA she served as Assistant to the Director of the Goethe-Institut, Boston, a German cultural institute. She has a B.A. in German and History from Bowdoin College.

Alexis Keogh, a Research Assistant with the WPF Program, recently completed her Master's degree in International Relations and Communications at Boston University. She is a graduate from Georgetown University with a degree from the School of Foreign Service. She has worked as a television producer in Washington, DC and Cape Town, South Africa.

Clive Gray is Senior Fellow in Development in the WPF Program of Intrastate Conflict. He directs the Equity and Growth through Economic Research (EAGER), an AID-funded research project. He was with HIID from 1964, first as resident advisor with the governments of Kenya, Colombia, Ethiopia, Indonesia, and Morocco. He has taught at the University of Indonesia, the University of Auvergne, and Tashkent University of Economics.

Malcolm McPherson is an economist with research interests in agricultural development, central banking, monetary policy, structural adjustment, and the institutional aspects of economic reform. As a part of the EAGER Project, he joined the WPF Program on Intrastate Conflict in July, 2000. He spent four years in Zambia, as the team leader on HIID's projects on macroeconomic reform and the computerization of tax administration. McPherson was previously a senior adviser to the Ministry of Finance and Trade in the Gambia as part of HIID's Economic and Financial Policy Analyses Project. He is co-editor, with Steven C. Radelet, of *Economic Recovery in the Gambia: Insights for Adjustment in Sub-Saharan Africa*. He is a joint author (with James Duesenberry and others) of two studies: *Improving Monetary Management in Sub-Saharan Africa and Improving Exchange Rate Management in Sub-Saharan Africa*.

Clifford F. Zinnes joined the WPF Program on Intrastate Conflict in July 2000 as Fellow in Development. He is an economic policy advisor specializing in the environmental sustainability of economic reform. He has worked in over twenty countries, and focuses on transition economies. During the 1990s he was Institute Associate at HIID. He spent five years resident in Romania as a senior policy advisor to the ministers of Reform, Privatization, European Integration, and Environment. Over this period he co-authored many of the country's laws on privatization, environmental protection, and water, as well as restructuring its water utilities and environmental protection regulatory agencies. Zinnes has published numerous papers on economic instrument design, valuation, trade and environment, the effect of ownership structure on regulatory compliance, and regulatory financing.

PUBLICATIONS

To review publications of the WPF Program on Intrastate Conflict, Conflict Prevention and Conflict Resolution and its members, see page 239.

EVENTS

To review events of the WPF Program on Intrastate Conflict, Conflict Prevention and Conflict Resolution and its members, see page 218.

CENTER-WIDE EVENTS

For more than two decades, the Center has had an extensive program of substantive seminars, events, and conferences. These regular meetings are sponsored by the Center's core, the four major programs, and many of its research projects within the programs — often in association with other academic institutions at Harvard or in the Cambridge area. These events serve all three of the Center's main purposes: research, training, and outreach.

BCSIA DIRECTOR'S SEMINAR SERIES

Director's seminars are designed primarily for important substantive presentations on subjects of interest to the Center by leading experts in the relevant field, whether from Harvard or beyond. Attendance is limited to BCSIA faculty, research fellows, and staff, and affiliated faculty and researchers from the Kennedy School, Harvard, and the Boston area. The seminars are held in the BCSIA Library and are catered.

September 21, 2000

“Kashmir and Nuclear Weapons in the Subcontinent”

VN Sharma, Former Chief of Staff on the Armed Forces of India

October 17, 2000

“The Trade Agenda of the Next Administration”

Ambassador Richard W. Fisher, Deputy US Trade Representative

October 18, 2000

“Singapore”

Minister Lee Kuan Yew

November 2, 2000

“The Plight of the Solitary Super Power: A European View”

Quentin Peel, International Affairs Editor, Financial Times

November 20, 2000

“Information Technology and Public Policy – Issues for the Future”

James B. Steinberg, Senior Advisor, Markle Foundation and Former Deputy National Security Advisor to President Clinton

December 4, 2000

“The Clinton Administration's Democracy and Human Right's Promotion

Dr. Morton H. Halperin, Director, Policy Planning Staff, U.S. State Department

December 7, 2000

“Keeping the Military Edge: The Organizational Challenge”

Ashton B. Carter, Ford Foundation Professor of Science & International Affairs & Co-Director, Preventive Defense Project and John P. White, Lecturer in Public Policy

December 13, 2000

“U.S. Defense Budgets, Strategies and Programs”
Rudy de Leon, Deputy Secretary of Defense

December 14, 2000

“American Foreign Policy”
Leon Feurth, National Security Advisor to Vice-President Al Gore and Bob Zoellick, Foreign Policy Advisor to the George W. Bush campaign

December 20, 2000

“Shaping the International Agenda: Issues Beyond International Security”
Leon Feurth, National Security Advisor to Vice-President Al Gore

January 29, 2001

“Unravelling Iraq’s Biological Warfare Program: A Personal Account”
Rod Barton, Former Principal Inspector for UNSCOM and Former Director of Proliferation Studies in the Australian Department of Defense

February 2, 2001

“Relations with the New Bush Administration: A Russian Perspective”
Andrea Kokoshin, Vice President of the Russian Academy of Sciences, Former First Deputy Minister of Defense and Former Secretary of the Russian Security Council

March 1, 2001

“Security Issues in the Middle East: Washington and Jerusalem Perspectives”
Marvin Feuer, Director for Defense and Strategic Issues at the American Israeli Public Affairs Committee

March 8, 2001

“Women in the Military”
Lieutenant Mara A. Motherway, United States Navy, Lieutenant Colonel Gail Allen, United States Air Force, Commander James D. Bjostad, United States Coast Guard, Lieutenant Colonel Thomas H. Stanton, United States Army

April 12, 2001

“New Leadership in the Middle East”
Nemir Kirdar, President and CEO Investcorp and Member of the BCSIA International Council

April 26, 2001

“The Future of the Defense Industry – Challenges of Arming the United States and its Coalition Partners for the 21st Century”
Jeffrey P. Bialos, Former Deputy Under Secretary of Defense for Industrial Affairs and current BCSIA fellow

BCSIA FORUM EVENTS

The Kennedy School's ARCO Forum of Public Affairs is an internationally acclaimed venue for speeches by heads of state; leaders in politics, government, business, labor, and the press; policy analysts; and community organizers. Forum events, which can hold up to 500 people, are open to the public and are often recorded for television and radio broadcast. BCSIA cosponsors and helps to invite speakers from all four of its program areas.

BCSIA BOARD OF DIRECTORS’ MEETINGS

The BCSIA Board of Directors meets every Tuesday of the academic year. The purpose of the meetings is to allow Board Members to keep abreast of the research projects under way across the Center's areas of expertise, and to maintain the sense of community and ownership among the Center's leaders. The focus of these meetings is an interdisciplinary seminar, about half of which are led by Board Members, and the other half by distinguished outside guests. Most meetings take place in the BCSIA Library over lunch; the third meeting of each month, however, takes place off-site over dinner.

September 19, 2000

"Foreign and Defense Policy and the Presidential Election"
Ambassador Robert Blackwill

September 26, 2000

"The 2000 Presidential Elections: Setting the Course for the World's Remaining Superpower"
David Pryor, former Senator from the State of Arkansas and the new Director of the Institute of Politics

October 10, 2000

"Discussion of Opportunities and Risks for a New Foundation"
Sam Nunn, Former Senator from Georgia, and Ted Turner Vice Chairman of Time Warner, Inc.

October 24, 2000

Two sides of the Israeli conflict
Brenda Shaffer and Dr. Jawad Anani, Former Chief of the Royal Court of Jordan, and Former Deputy Prime Minister of Jordan, Minister of Trade, and Minister of Information

October 31, 2000

"UN Critique on Peace Operations"
Brian Atwood, former Director of USAID and U.S. representative on the international commission established by the Secretary General of the UN.

November 14, 2000

Review and discussion of the Nunn-Turner potential project to reduce nuclear dangers

November 21, 2000

"The Impact of Technology on Intelligence"
John Gannon, Chairman of the National Intelligence Council

November 29, 2000

Shai Feldman

December 12, 2000

"Creating Competitive Advantages in Today's Internet Economy"
Anthony Tjan and Alexandre Scherer, Co-founders, ZEFER Corp.

December 19, 2000

Holiday dinner

February 13, 2001

Business Meeting

February 20, 2001

"The National Missile Defense"

John Deutch and John White

February 27, 2001

“Global Warming”

John Holdren, Henry Lee, and Ted Parsons with Rob Stavins and Bill Clark

March 13, 2001

Business meeting

March 20, 2001

Dennis Ross

April 3, 2001

Shai Feldman

April 10, 2001

John Engler, Governor of Michigan

April 17, 2001

"The Challenge of Tactical Nuclear Weapons"

Gang of Four Research Group and Bill Potter, Director of the Center for Nonproliferation Studies at Monterey

April 24, 2001

“The Energy Crisis”

Former Energy Secretary Bill Richardson and AMB Jim Collins

May 8, 2001

“Science and Technology”

Minister Ronaldo Sardenberg of Brazil

May 15, 2001

Final Dinner

May 22, 2001

“Science and Technology”

Minister Ronaldo Sardenberg of Brazil

OTHER BCSIA-WIDE EVENTS

September 14-15, 2000

Luncheon

BCSIA Orientation

September 13, 2000

Open House

October 18, 2000

Seminar

Minister Lee Kuan Yew

March 21, 2001

Dinner with Al Carnesale

April 19, 2001

Reception? Welcoming John Ruggie to the Belfer Center

May 1, 2001

Research lunch

“Policies and Politics of Global Climate Change”

Todd Stern and the Gang of Four

ENVIRONMENT AND NATURAL RESOURCES PROGRAM

ENVIRONMENT AND NATURAL RESOURCES PROGRAM EVENTS

As part of its outreach initiative, ENRP brings key players to the Kennedy School of Government. ENRP sponsors Forum events at which environmental leaders give major policy addresses. ENRP convenes workshops and executive sessions that bring together senior officials from government, industry, and interest groups to discuss critical policy issues in a neutral setting.

September 7, 2000

Lecture

How Many Transitions doth the Sustainability Transition Need?, Robert Kates, Brown University

September 21-22, 2000

Conference

Harvard Electricity Policy Group, Twenty-Third Plenary Session, Boston, Massachusetts

October 4, 2000

Seminar

Should We Wait for More Data? The Curious Role of ‘Learning’ in Climate Policy, Henry Jacoby and Mort David Webster, MIT

October 11, 2000

Forum Event

Green Building: A Revolution in Architecture, William McDonough, architect, *Time Magazine* 1999 Hero of the Planet

October 18, 2000

Seminar

Controlling Stocks and Flows to Promote Environmental Quality, Nathaniel Keohane, Richard Zeckhauser, and Benjamin Van Roy (Stanford)

October 19, 2000

Green Building Seminar

High Performance Buildings – Getting Them Built, Marc Rosenbaum, AIA and PE, and Dr. John Spengler, Harvard School of Public Health

November 1, 2000

Seminar

Smart Growth and the Supply of Sprawl, Jacqueline Geoghegan, Clark University and Nancy Bockstael, University of Maryland

November 8, 2000

Seminar

The Malleability of Undisclosed Utilitarianism, Geir Asheim, University of Oslo

November 15, 2000

Seminar

Survival is a Luxury Good: The Increasing Value of a Statistical Life, James Hammitt, Harvard School of Public Health

December 8, 2000

Special Session

Harvard Electricity Policy Group, Houston, TX

December 11, 2000

Colloquium

Innovation and Entrepreneurship for the Environment: Three Great Ideas from History

December 13, 2000

Seminar

Any Non-Welfarist Method of Policy Assessment Violates the Pareto Principle, Louis Kaplow and Steven Shavell, Harvard Law School

December 15, 2000

Seminar

Ozone and Ownership: Finding Country-Driven Approaches to Implement the Montreal Protocol in Developing Countries, Rasmus Rasmusson, Member of the Executive Committee of the Multilateral Fund for the Montreal Protocol

February 1-2, 2001

Conference

Harvard Electricity Policy Group Twenty-Fourth Plenary Session, San Diego, California

February 7, 2001

Seminar

Does Air Quality Matter: Evidence from the Housing Market, Michael Greenstone, University of Chicago

February 15, 2001

Green Building Seminar

Indoor Air Quality, Ventilation and Building Performance, Jack Spengler and Don Milton, Harvard School of Public Health

March 13, 2001

Seminar

Carol Browner, former Administrator, U.S. EPA

March 21, 2001

Seminar

Teaching the Predictive Power of Greener National Accounting Measures, Jeffrey Vincent, Harvard University

March 25-31, 2001

Executive Training Session

Infrastructure in a Market Economy, Singapore

April 4, 2001

Special Session on California Crisis

Harvard Electricity Policy Group, Philadelphia, PA

April 11, 2001

Seminar

Diversity, Rarity and the Value of Species, Andrew Solow, Woods Hole Oceanographic Institute

April 11, 2001

Lecture

Running Out of Time? The Cascading of Environmental Consequences

James Gustave Speth, Dean, The Yale School of Forestry

Commemoration of the 100th Anniversary of the Yale School of Forestry

April 17, 2001

Forum (with Business and Government Center)

The Greening of Corporate America, Ray Anderson, CEO, Interface, Co-Chair (1997-1999), President's Council on Sustainable Development

April 24, 2001

BCSIA Director's Lunch

William Richardson, former Secretary of Energy

April 26, 2001

Green Buildings Seminar

Rethinking the Relationship Between Buildings and Energy Systems

Michelle Addington, Harvard Graduate School of Design

April 29 – May 5, 2001

Executive Training Session

Latin American University Training to Implement Infrastructure in a Market Economy Program

May 4-5, 2001

Workshop with David Rockefeller Center

Electricity Regulation in Latin America

May 1, 2001

Research Lunch

A Discussion on the Policies and Politics of Global Climate Change, Todd Stern, Resident Fellow, German Marshall Fund

May 10-11, 2001

Conference, Co-Sponsored with STPP

Voluntary, Collaborative and Information-Based Policies: Lessons and Next Steps for Environmental and Energy Policy in the United States and Europe, Kennedy School of Government, (See STPP section of Annual Report for more details)

June 11-12, 2001

Conference

Harvard Electricity Policy Group Twenty-Fifth Plenary Session, Cambridge, MA

July 15-27, 2001

Executive Training Session

Infrastructure in a Market Economy

CONFERENCES HOSTED BY THE ENVIRONMENT AND NATURAL RESOURCES PROGRAM

October 5, 2000

Emissions Trading in Russia: Opportunities and Challenges

Kennedy School of Government, Harvard University

If the nations of the world agree to the development and implementation of an international greenhouse gas trading regime, Russia could be a major seller of emission reduction credits, possibly earning more than \$25 billion in the period 2008-2012.

BCSIA's Environment and Natural Resources Program held a workshop on this important topic in October for a high-level group of officials from Russia and the United States. The invitees included members of key committees in the Duma, officials from the Russian electric utility company (RAO-UES), the largest single emitter of carbon in Russia, as well as senior American environmental and greenhouse gas trading representatives.

The group discussed the opportunities and obstacles to implementing carbon trading. They emphasized the importance of trading, but perspectives varied about the timing, placement and the capacity of Russia to ready itself to take advantage of this opportunity.

The workshop report is now available in English and Russian.

October 11-13, 2000

E-Vision 2000

Washington, DC

How will the revolution in Information Technology affect the way energy is supplied and used in the United States? This is the question that Dan Reicher, Assistant Secretary of the US Department of Energy, posed to the Environment and Natural Resources Program (ENRP). Henry Lee, Director of ENRP, and his colleagues convened a panel of several of the top experts in the United States to participate in the Department's E-Vision 2000 conference held in Washington DC on October 13-15. Participants on this panel included Professor Dale Jorgenson, Brad Allenby, Vice-President of AT&T, Bruce Stram, Vice President of Enron Energy Services, Bill Reed, Vice President of SEMPRA, Chuck Miller, CEO of ProcureZone, Karl E. Stahlkopf, Vice-President of EPRI and Joseph Romm, Executive Director, CECS of Global Environment & Technology Foundation.

The panel debated many facets of this issue and identified the most important future research questions that the Department should explore. A report synthesizing the panel's discussions and containing papers authored by the participants is being prepared by the RAND corporation and should be available in March.

May 31, 2001

The Role of Science and Economics in Setting Environmental Standards

Washington, DC

The Environment and Natural Resources Program, the Center for Business and Government, and the Environmental Economics Program convened an interdisciplinary workshop in Washington DC focusing on the role of science and economics in setting environmental risk standards. The Supreme Court's review of EPA's air quality standards in the American Trucking case called attention to the role of costs in standard-setting, while the Bush Administration's decision to revisit key drinking water standards has brought the role of risk and economic analysis into the fore.

This workshop focused on how scientific research is organized and how it contributes to risk management. It addressed the role of benefit-cost and cost-effectiveness analysis in light of present political and legal constraints, and discussed strategies for institutionalizing risk and economic analysis in the setting of environmental standards.

WORKSHOPS HOSTED BY THE GLOBAL ENVIRONMENTAL ASSESSMENT PROJECT

September 10-12, 2000

Global Environmental Assessment Fellows' Research Workshop

Organized by William Clark, Kennedy School of Government, Harvard University

January 10-12, 2000

Institutions for Global Environmental Assessment Workshop

Organized by William Clark, Kennedy School of Government, Harvard University; and

Ronald Mitchell, Center for Environmental Science and Policy, Institute for International Studies, Stanford University

January 16-18, 2001

Designing Effective Assessments Workshop

Organized by Jill Jaeger, International Human Dimensions Programme on Global Environmental Change, and Alexander Farrell, Dept. of Engineering and Public Policy, Carnegie Mellon University

March 1-3, 2001

Workshop on Designing Effective Assessments: The Role Of Participation, Science and Governance, and Focus Workshop held in Copenhagen, Denmark co-organized by

Noelle Eckley and David Stanners, European Environment Agency; and

Global Environment Assessment Project members:

Jill Jaeger, International Human Dimensions Programme on Global Environmental Chang; and Alexander Farrell, Dept. of Engineering and Public Policy, Carnegie Mellon University

April 6-7, 2001

Workshop on Localizing and Globalizing: Knowledge Cultures of Environment and Development

Organized by Sheila Jasanoff, Kennedy School of Government, Harvard University; and Marybeth Long, Kennedy School of Government, Harvard University

WORKSHOPS HOSTED BY THE RESEARCH AND ASSESSMENT SYSTEMS FOR SUSTAINABILITY PROJECT

May 22-25, 2000

Workshop On Vulnerability to Global Environmental Change: Challenges for Research, Assessment and Decision Making

Airlie House, Warrenton, Virginia

This Workshop focused on questions about the vulnerability of social and ecological systems as a central focus of policy-driven assessments of global environmental risks. Participants included communities of decision-oriented vulnerability assessors for global environmental change issues, research-oriented vulnerability scholars generally focusing on regional scale human-environment interactions, and those conducting vulnerability assessments that assist in targeting improved intervention and mitigation strategies. An integrated framework for vulnerability-based assessments of climate and other global changes was sketched. This framework has the potential to improve significantly the production of policy-relevant insights into the social and environmental implications of global environmental change.

October 11-14, 2000

Sustainability Science Workshop

Organized by Robert Kates and William Clark

Friibergh Manor, Örsundsbro, Sweden

Scientists from the natural and social sciences and from across the world convened at Sweden's Friibergh Manor in October 2000. Participants concluded that promoting the goal of sustainability requires the emergence and conduct of the new field of sustainability science. Sustainability science seeks to improve on the understanding of nature-society interactions. By structure, method, and content, sustainability science must differ fundamentally from most science as we know it. Sustainability science will learn to work with all manner of social groups to recognize how they come to gain knowledge, establish certainty of outlooks, and adjust their perceptions as they relate to each other's needs. Meeting the challenge of sustainability science will also require new styles of institutional organization to foster and support inter-disciplinary research over the long term; to build capacity for such research, especially in developing countries; and to integrate such research in coherent systems of research planning, assessment and decision support. The article, "Sustainability Science," summarizes the key findings of this meeting (*Science*, 292: 641-2, April 27, 2001).

January 10-12, 2001

Institutions for Global Environmental Assessment Workshop

Organized by William Clark, Kennedy School of Government, Harvard University; and

Ronald Mitchell, Center for Environmental Science and Policy, Institute for International Studies, Stanford University

Kennedy School of Government, Harvard University

This Workshop was a meeting for the authors of a GEA volume summarizing insights on the influence of assessments viewed as information institutions. The book, "The Influence of Environmental Assessments," draws from papers by fellows and faculty of the Global Environmental Assessment project and will be edited by William Clark and Ronald Mitchell. The primary audience for the Institutions volume is scholars of international institutions, particularly of environmental policy, who are wrestling with questions of how, and under what circumstances, institutions that deal with information influence issue development in an increasingly globalized world.

January 16-18, 2001

Designing Effective Assessments Workshop

Organized by Jill Jaeger, International Human Dimensions Programme on Global Environmental Change, and Alexander Farrell, Dept. of Engineering and Public Policy, Carnegie Mellon University

This Workshop was a meeting for the authors of a volume on the design of environmental assessments. The book, tentatively titled *Global and Regional Environmental Assessments: Design and Practice*, draws from papers by fellows and faculty of the Global Environmental Assessment Project and will be edited by Alex Farrell and Jill Jaeger. The volume is for practitioners of assessments, scientists, research program managers, decision-makers and their staff, as well as scholars interested in environmental policy-making and in the use of technical information in policy-making.

March 1-3, 2001

Workshop on Designing Effective Assessments: The Role of Participation, Science and Governance, and Focus

Workshop held in Copenhagen, Denmark co-organized by

Noelle Eckley and David Stanners, European Environment Agency; and

Global Environment Assessment Project members:

Jill Jaeger, International Human Dimensions Programme on Global Environmental Change; and Alexander

Farrell, Dept. of Engineering and Public Policy, Carnegie Mellon University

From 1-3 March 2001, a group of 30 practitioners and scholars met in Copenhagen to discuss how environmental assessments can be conducted more effectively. The Workshop was co-organized by the Global Environmental Assessment Project and the European Environment Agency, with contributions from the European Forum on Integrated Environmental Assessment (EFIEA). In order to explore what lessons those designing environmental assessments might learn from the experiences of others, workshop participants examined three case studies, and discussed in working groups the issues of participation (who is involved in assessment processes), science and governance (how assessments are conducted, particularly with respect to the interactions between scientific experts and policy makers), and focus (what is within, or excluded from, the assessment's scope).

May 29-June 1, 2001

Research and Assessment Systems for Sustainability Program Retreat

Organized by William Clark

Airlie House, Warrenton, Virginia

This Workshop is a working session in which a select group of scholars seek to advance the intellectual agenda of sustainability science through a combination of plenary and small working group sessions. The first day will be devoted to exploring the range of conceptual models that are most critical to a vulnerability/resilience concept, focusing on the need for a human-environment approach. The second day will be devoted to case studies against which to test our versions of the vulnerability concept for the human-environment construct, exploring the different vulnerability conceptualizations in the context of the specific place (and to specific threats). In day three we would explore how well configured are the present national and international research programs structured to peer review and recognize place-based, integrated research.

SOCIAL SCIENCE PERSPECTIVE ON ENVIRONMENTAL ASSESSMENT SEMINAR

William C. Clark

Research Seminar for the Global Environmental Assessment Project and the Research and Assessment Systems for Sustainability Program at the Environment and Natural Resources Program Belfer Center for Science and International Affairs, Kennedy School of Government Harvard University

September 7, 2000

Fellows' Orientation

September 7, 2000

How Many Transitions doth the Sustainability Transition Need?

Robert Kates, Independent Scholar

September 25, 2000

Research and Assessment Systems for Sustainability

William Clark, Kennedy School of Government, Harvard University

October 16, 2000

Environmental Resources at Harvard University

Tom Parris, Environmental Resources Librarian, Harvard College

October 30, 2000

Framing: How Do Different Framings Emerge and what Implications do they have for Research Communities, Political Stakeholders, and Policy?

William Clark

November 6, 2000

Epistemic Communities, Advocacy Coalitions and Issue Networks

William Clark

November 13, 2000

Agency, Boundary Objects, Organizations and Negotiations

Frank Alcock, Kennedy School of Government, Harvard University

November 20, 2000

Institutions for Research Assessment and Decision-Support Systems

Jill Jaeger, International Human Dimensions Programme on Global Environmental Change, David Cash, Kennedy School of Government, Harvard University,

Mark Hengen, Johnson And Wales University

Robert Frosch, Kennedy School of Government, Harvard University

November 27, 2000

Boundary Organizations

William Clark

December 4, 2000

Information and Knowledge Provision for Policy Makers: Some European Environment Agency Contributions to the 'Framing' of Environmental Assessments

David Gee, European Environment Agency

December 11, 2000

Update on the Global Environmental Assessment Volumes

William Clark

February 8, 2001

Update on the Global Environmental Assessment Volumes
William Clark

February 22, 2001

Sustainability Information and Pension Fund Investment
Bernd Kasemir, Kennedy School of Government, Harvard University

Could Assessments Learn? A Comparative Study of LRTAP and IPCC
Bernd Siebenhüner, Kennedy School of Government, Harvard University

March 1, 2001

To Whale or Not to Whale: Conflicts Over Species Protection and Ways of Life in the Pacific Northwest
Marybeth Long, Kennedy School of Government, Harvard University

Localized and Globalized: Conflicting Influences on Brazilian Climate Scientists
Myanna Lahsen, Kennedy School of Government, Harvard University

March 8, 2001

Design Issues in Distributed Research, Assessment and Decision Support Systems: A Practitioner's View of UNEP's Global Environment Outlook
László Pintér, Kennedy School of Government, Harvard University

International Council for the Exploration of the Seas
Frank Alcock, Kennedy School of Government, Harvard University

March 22, 2001

The Kyoto Protocol's Clean Development Mechanism: A Sustainability Perspective
Ian Rowlands, Director, Environment and Business Program, University of Waterloo

April 5, 2001

Update on Designing Effective Assessments Workshop, Sustainability Science Developments, and IGBP and IHDP Research Plans
William Clark

May 3, 2001

Efforts to Apply the Advocacy Coalition Framework to Understand the Use of Technical Information in Transnational Environmental Affairs
Paul Sabatier, Department of Environmental Science and Policy, University of California at Davis

May 4, 2001

Hot Climate Politics: How could International Science and Science Funding React Together?
Hansvolker Ziegler, Deputy Director General for Environmental and Socio-economic Research, German Federal Ministry for Education and Research

May 17, 2001

Towards a Spatial Analysis of Vulnerability to Environmental Stress
Colin Polsky, Geography Department, Pennsylvania State University

May 24, 2001

Research, Assessment and Decision Support Systems for Sustainability
David Cash and William Clark, Kennedy School of Government, Harvard University

June 14, 2001

Could Assessments Learn? A Comparative Study of LRTAP and IPCC
Bernd Siebenhüner, Kennedy School of Government, Harvard University

Design issues in distributed RADs: A Practitioner's View of UNEP's Global Environment Outlook
László Pintér, Kennedy School of Government, Harvard University

June 21, 2001

International Council for the Exploration of the Seas
Frank Alcock, Kennedy School of Government, Harvard University

Sustainability Information and Pension Fund Investment
Bernd Kasemir, Kennedy School of Government, Harvard University

June 28, 2001

To Whale or Not to Whale: Conflicts Over Species Protection and Ways of Life in the Pacific Northwest
Marybeth Long, Kennedy School of Government, Harvard University

Localized and Globalized: Conflicting Influences on Brazilian Climate Scientists
Myanna Lahsen, Kennedy School of Government, Harvard University

HARVARD INFORMATION INFRASTRUCTURE PROJECT

HIIP SEMINAR: HARVARD INFORMATION INFRASTRUCTURE PROJECT SEMINAR ON INFORMATION POLICY

The HIIP has provided a neutral, interdisciplinary forum for addressing a wide range of emerging policy issues relating to information infrastructure, its development, use, and growth. The HIIP Seminar provides a source of input and dissemination for leading research and an excellent opportunity to bring current information and communication policy developments and implementation to the attention of scholars, companies, and policymakers.

October 16, 2000

Stefan Brands, Senior Cryptographer, Zero-Knowledge Systems
“Rethinking Public Key Infrastructures and Digital Certificates: Building in Privacy”

October 23, 2000

Jerry Mechling, Director, Program on Strategic Computing and Telecommunications in the Public Sector, Kennedy School of Government
“Eight Imperatives for Leaders in a Networked World”

October 30, 2000

David Hart, Associate Professor of Public Policy, Kennedy School of Government
“Capital Investment: The Evolving Role of the High Tech Industry in Washington”

November 6, 2000

John Gage, Chief Researcher and Director of the Science Office, Sun Microsystems and Fellow, Shorenstein Center on the Press, Politics and Public Policy, Kennedy School of Government
“Distributed Computing and Community Access”

November 13, 2000

Peng Hwa Ang, Vice-Dean, School of Communication Studies, Nanyang Technological University (Singapore), and Fellow, Harvard Information Infrastructure Project
“The Myth of Internet (Non-) Regulation”

November 20, 2000

Venkatesh Narayanamurti, Dean, Division of Engineering and Applied Sciences, Harvard University
“The Intellectual Infrastructure Behind the Information Technology Frontier”

November 27, 2000

Mary Rundle, Legal Affairs Officer, Trade and Finance Division, World Trade Organization, and Fellow, Harvard Information Infrastructure Project
“E-Commerce and E-Finance: Hidden Issues”

December 4, 2000

Anthony Tjan and Alexandre Scherer, Co-Founders, ZEFER
“Current State and Future Trends of the Internet”

February 26, 2001

Radia Perlman, Distinguished Engineer, Sun Microsystems Laboratories
“Private Communication in a Public World: Challenges in Deploying PKI”

March 5, 2001

David Banisar, Deputy Director, Privacy International, and Senior Fellow, Electronic Privacy Information Center (EPIC)
“Wiretapping the Net”

March 12, 2001

Jason Catlett, President and Founder, Junkbusters Corp.
“Consumer Profiling: Rights and Wrongs, Benefits and Harms”

March 19, 2001

Theodora Welch, Fellow, Harvard Information Infrastructure Project
“Networks of Governance: Privatization in Global Telecommunications”

April 2, 2001

Steven Levy, Senior Editor and Chief Technology Writer, *Newsweek*, and Author of *Crypto* and *Hackers*
“How the Code Rebels Beat the Government—Saving Privacy in the Digital Age”

April 16, 2001

Charles Wiecha, Fellow, Harvard Information Infrastructure Project
“Next-generation Web Services: Emerging Technologies and Policy Issues”

April 23, 2001

Karen Schneider, Library Administrator, Shenendehowa Public Library, Clifton, New York
“Intellectual Freedom Issues and the Passage of CIPA”

April 30, 2001

Kathleen Hartford, Professor of Political Science, University of Massachusetts, and Associate in Research, The Fairbank Center for East Asian Research, Harvard University
“A Tale of Two Infoports: Shanghai and Hangzhou”

2000 Harvard Information Infrastructure Project Country Focus: United Kingdom

Each year, the HIIP selects a country for special focus on its information policies. In 2000, the HIIP selected the United Kingdom as the subject of consideration. The HIIP sponsored this country focus in cooperation with the British Consulate-General in Boston.

October 12, 2000

James Graf, President, British Telecom North America, United States
“Telecommunications Today: Unblocking the Highway”

2001 Harvard Information Infrastructure Project Country Focus: Japan

In 2001, the HIIP selected Japan as country for special focus on its information policies.

April 24, 2001

Takeo Shiina, Senior Advisor and former Chairman, IBM Japan
“Japan and the World Economy”

April 30, 2001

Sachio Semmoto, Founder, Chairman and Chief Executive Officer, eAccess, Ltd., Japan
“Towards the Rebirth of Japan: Development of Broadband Access Infrastructure”

HARVARD UNIVERSITY FACULTY SEMINAR ON INFORMATION POLICY

The HIIP created in 1997 and organizes the Harvard University Faculty Seminar on Information Policy, which is chaired by Kennedy School Dean Joseph S. Nye. During the first two years, the theme of the faculty seminar was Information Infrastructure and Governance. The theme of the seminar during 1999-2000 was Information Policy and the Asia-Pacific Region. The seminar is intended to increase cooperation and multidisciplinary activity throughout Harvard and to create networks among faculty interested in information infrastructure issues. Faculty throughout the university have participated in the seminar and brought their expertise to bear on the interplay of information infrastructure and governance, the manner in which their fields will affect or be affected by this dynamic, and the relationships of their domains to others, both those with which they have traditionally shared borders and those with which now, due to information technology advances, they have begun or will soon begin to overlap or to share common boundaries.

November 29, 2000

Michael Roberts, President and Chief Executive Officer, Internet Corporation for Assigned Names and Numbers (ICANN)
“I Think ICANN: The U.S. Non-profit Corporation That Would Run the Global Domain Name System”

LEWIS M. BRANSCOMB LECTURE SERIES

The HIIP and STPP continued the Lewis M. Branscomb Lecture Series, established in 1999 in honor of Dr. Lewis M. Branscomb and in recognition of his many accomplishments and contributions to the field of science and technology. The Branscomb Lectures are held once each semester and feature senior academics and practitioners.

December 4, 2000

Mary Good, Donaghey Professor and Dean, Donaghey College of Information Science and Systems Engineering, University of Arkansas at Little Rock; President, American Association for the Advancement of Science; and former Under Secretary for Technology, Technology Administration, U.S. Department of Commerce (1993-97)

“U.S. Research Policy: A Status Report”

March 22, 2001

Neal Lane, University Professor, Rice University (Department of Physics and Astronomy and James A. Baker III Institute for Public Policy); Science Advisor to President Clinton and Director of White House Office of Science and Technology Policy (1998-2001); and Director of the National Science Foundation (1993-98)
“Science on Pennsylvania Avenue”

HARVARD INFORMATION INFRASTRUCTURE PROJECT CONFERENCES

October 5-7, 2000

4th Annual U.S.-Russian Investment Symposium on Financial and Direct Investment Opportunities in Russia: New Leadership—New Opportunities
Sheraton Boston Hotel, Boston, Massachusetts
Co-sponsored by the Harvard Information Infrastructure Project, the Belfer Center for Science and International Affairs, Financial Times Conferences, The Conference Board, and the U.S.-Russia Business Council

November 6-7, 2000

Workshop on Advanced Communications Access Technologies: Economic and Policy Issues to Ensure Widespread Availability in Traditional High-cost Areas
John F. Kennedy School of Government, Harvard University
Organized by Harvard Information Infrastructure Project in collaboration with the Information Technology Office (ITO) of the Defense Advanced Research Project Agency (DARPA) and the U.S. Technology Policy Working Group

March 6-9, 2001

CFP 2001, the Eleventh Conference on Computers, Freedom and Privacy, Hyatt Regency, Cambridge, Massachusetts
HIIP Director Deborah Hurley, Chair of CFP2001

June 4, 2001

Policy Briefing: Emerging Cyberspace Issues—Internet Jurisdiction and Global Privacy Protection, National Press Club, Washington, D.C.
Co-sponsored by the Electronic Privacy Information Center (EPIC) and the Harvard Information Infrastructure Project

June 28-30, 2001

Conference on Information Policy in the New Economy, Rüschnikon, Switzerland
Organized by the Harvard Information Infrastructure Project in collaboration with Swiss Re’s Centre for Global Dialogue

OTHER HARVARD INFORMATION INFRASTRUCTURE PROJECT EVENTS

February 8, 2001

Mary Graham, Kennedy School of Government
“Information Disclosure as Risk Regulation”

April 5, 2001

Carmelle Coté, Responsible Program Manager for International Relations, Environmental Research Systems Institute, Inc.
“The Geography of War: Information Technologies and Humanitarian Affairs”

April 25, 2001

V.K. Samaranyake, Director, Institute of Computer Technology, and Professor of Computer Science, University of Colombo, Sri Lanka

“The Digital Divide: A Case Study of Sri Lanka”

INTERNATIONAL SECURITY PROGRAM

ISP BROWN BAG SEMINARS

The brown bags provide an opportunity for BCSIA research fellows and visiting scholars to discuss their ongoing projects in an informal setting. Speakers present their work and then field questions from the audience. All brown bags are held regularly from 12:00 p.m. to 2:00 p.m. on Fridays in the BCSIA Library.

September 22 , 2000

“The Planned National Missile Defense System: Will it Work? And How Will We Know?”
George Lewis, Associate Director, MIT Security Studies Program

September 29, 2000

“Do States Matter? Hypotheses on Democratization and War”
Jens Meierhenrich, Fellow, International Security Program

October 6, 2000

“Democracy and Victory: Does Regime Type Matter”
Michael Desch, Associate Professor and Associate Director, Patterson School of Diplomacy and International Commerce, University of Kentucky

October 13, 2000

“No Brave New World: Life Integrity Rights and Freedom in the World, 1997 and 1987”
Helen Fein, Director, Institute for the Study of Genocide

October 20, 2000

“Civil-Military Relations and the Use of Force”
John Garofano, Senior Fellow, International Security Program

October 27, 2000

“Monitoring Nuclear Nonproliferation Using High Resolution Imaging Satellites”
Hui Zhang, Fellow, Managing the Atom Project

November 1, 2000

“UN Peacekeeping in Civil Wars: Success, Failure, and Organizational Change”
Lise Morjé Howard, Fellow, International Security Program/World Peace Foundation

November 3, 2000

“Managing Uncertainty: The Sources and Effects of Perceptions of Intentions in International Politics”
David Edelstein, Fellow, International Security Program

November 17, 2000

"Ethnic Bargaining Games: Signals, Claims and Minority Mobilization in East Central Europe."

Erin Jenne, Fellow, International Security Program and World Peace Foundation

December 1, 2000

“The CWC and the Middle East”

Eitan Barak, Fellow, International Security Program

February 2, 2001

“Policy Isn’t Everything: The Management Crisis in National Security”

Ash Carter, Ford Foundation Professor of Science and International Affairs,

February 9, 2001

“Kennedy’s Wars”

Lawrence Freedman, Professor, Department of War Studies, King’s College, London

February 16, 2001

“When Hell is War: The Futility of Barbarism as a Strategy in War”

Ivan-Arreguin Toft, Fellow, International Security Program,

February 23, 2001

“Economic Externalities of Foreign Wars”

Eugene Gholz, University of Kentucky, Louisville

March 9, 2001

“Tragic Challenges – How and Why Communal Groups Provoke Genocidal Retaliation”

Alan Kuperman, Fellow, International Security Program,

March 16, 2001

“Assessing the Proliferation Debate: Lessons from South Asia”

Nathan Busch, Fellow, International Security Program,

April 6, 2001

“Religion: Help or Hindrance in the Pursuit of Peace”

Oliver McTernan

April 13, 2001

“Caution: Children at War The New Doctrine of Child Soldiers”

Peter Singer, Fellow, International Security Program,

April 20, 2001

“Nuclear Weapons and Crisis Stability in South Asia”

Samina Ahmed, Fellow, International Security Program,

April 27, 2001

“Power, Socialization and Institution-Building: Generalizing from East Asia”

Amitav Acharya

May 4, 2001

“Differing Threat Assessments & Responses to Terrorism with CRBN Weapons”

Gavin Cameron, Fellow, International Security Program

May 11, 2001

“In America’s Shadow: Global Responses to US Primacy”

Stephen Walt, Evron and Jean Kirkpatrick Professor of International Affairs

May 18, 2001

“A Hierarchy of Innocence: The American Media’s Coverage of International Affairs”

Susan Moeller, Fellow, International Security Program

SCIENCE, TECHNOLOGY, AND PUBLIC POLICY PROGRAM

May 16, 2001

Seminar

“Biodiversity, Territory and Culture: The View of Social Movements”

Professor Arturo Escobar, Department of Anthropology, University of North Carolina

May 10-12, 2001

Workshop

“Voluntary, Collaborative and Information-Based Policies: Lessons and Next Steps for Environmental and Energy Policy in the United States and Europe”

The workshop brought together scholars and practitioners from government, industry, and the NGO community to examine the effectiveness of this set of innovative policy mechanisms, and the role that they can play in the future.

May 8, 2001

Seminar

“Technology Management in Developing Countries: Impact on Industry of Latin American Research and Technology Organizations”

Dr. Alberto Araoz, Visiting Scholar, College of Management, Univ. of Massachusetts, Amherst

May 4-5, 2001

Workshop

“Owing Up: Bodies, Selves and the New Genetic Property”

Various Speakers

May 3, 2001

Seminar

"Energy Innovation Policy in China"

Jimin Zhao, Research Fellow, BCSIA

April 26-28, 2001

Conference

“Biotechnology and Global Governance: Crisis and Opportunity”

April 26, 2001

Seminar

“Controlling Loose Nukes in the Bush Administration”
Matthew Bunn, Deputy Director, STPP, BCSIA

April 23, 2001

Seminar

“Everything But Article 27.3: TRIPS and Sustainable Development”
Professor Konrad Von Moltke, International Institute for Sustainable Development; and Mark Halle,
Director, Trade and Investment Program

April 20-21, 2001

Workshop

“Global Governance of Technology, Meeting the Needs of Developing Countries”
Various speakers

April 19, 2001

Seminar

“Real Options: Dealing With Uncertainty in Formulating Technology Policy”
Richard de Neufville, Massachusetts Institute of Technology; Research Fellow, BCSIA

April 12, 2001

Seminar

“International Plutonium Storage”
Eugene Bae, Massachusetts Institute of Technology; Research Fellow, BCSIA

April 10-11, 2001

Conference

“Entrepreneurship and Public Policy”

April 9, 2001

Colloquium

“Genetics and Society Colloquium: A Discussion with Henry T. Greely”
Henry T. Greely, Co-Director of the Stanford Program on Genomics, Ethics, and Society, Stanford
University

April 6-7, 2001

Workshop

“Localizing and Globalizing: Knowledge Cultures of Environment and Development”
Various Speakers

April 5, 2001

Seminar

“Experience Curves and Photovoltaic Technology Policy”
Robert Margolis, Research Fellow, BCSIA

March 22, 2001

Lecture

“Science on Pennsylvania Avenue”
Dr. Neal Lane, Science Advisor to President Clinton and former director of White House Office of
Science and Technology Policy and former director, National Science Foundation

March 21, 2001

Seminar

“Some Ethical Questions Concerning Genetically Modified Foods”

Dr. Gary Comstock, Bioethics Institute, Iowa State University

March 19, 2001

Colloquium

“Genetics and Society Colloquium: A Discussion with Susan Wolf”

Professor Susan Wolf, University of Minnesota

March 16-17, 2001

Workshop

“The Machinery of Representation: Voting Technologies and the 2000 Presidential Election”

This workshop will focus on the epistemological and sociotechnical dimensions of the contested vote in Florida, examining the issues raised for science and technology studies (S&TS), as well as for related political, policy, and legal analysis.

March 15, 2001

Seminar

“Critical Issues in the Development and Diffusion of Climate-Friendly Products”

Ajay Mathur, World Bank

March 8, 2001

Seminar

“U.S.-India Relations: Where Do We Go From Here?”

A. Gopalakrishnan, Research Fellow, BCSIA

March 1, 2001

Seminar

“Technology Policy and Global Warming”

David Victor, Council on Foreign Relations

February 27, 2001

Seminar

“Science and Social Outcomes: Updating Outdated Models for Science Policy”

Professor Michael Crow, Executive Vice Provost, Columbia University and School of International and Public Affairs, Columbia University, New York

February 23, 2001

Seminar

“Moving on or COPping Out? Building a Foundation for Global Action on Climate Protection”

Daniel M. Kammen, Associate Professor of Energy and Society; Director, Renewable and Appropriate Energy Laboratory (RAEL), Energy and Resources Group (ERG) Univ. of Cal., Berkeley

February 22, 2001

Seminar

“Energy Innovation in China”

Xu Jing, Kelly Sims, BCSIA Research Fellows; and John P. Holdren, Director, STPP, BCSIA

February 21, 2001

Seminar

“The Role of Trust in Regulation: An International Perspective”

Professor Ragnar Lofstedt, Faculty of Public Health, Harvard School of Public Health

February 15, 2001

Seminar

“Three Models of Nuclear Proliferation”

James Walsh, Research Fellow, BCSIA

February 1, 2001

Seminar

“The Government's Role in Filling the Financial and Research Gap for the Commercialization of New Energy Technologies”

Vicki Norberg-Bohm, Exec. Director, ETIP/ STPP, BCSIA

January 31, 2001

Seminar

“The Genie in the Genome: Putting Biotechnology in Context”

Richard Manning, Freelance Environmental Journalist; Lolo, Montana

January 10, 2001

Seminar

“An International Investment Agreement: Why is it Needed for Sustainable Development?”

Professor Konrad Von Moltke, International Institute for Sustainable Development, Winnipeg, Manitoba

December 19, 2000

Seminar

“Nuclear Safety in China”

Evan Feigenbaum, Research Fellow, BCSIA

December 12, 2000

Seminar

“Options for Managing Spent Nuclear Fuel in China: Reprocessing and Storage”

Hui Zhang, Research Fellow, BCSIA

December 12, 2000

Seminar

“Technology, Growth and Development: An Induced Innovation”

Vernon W. Ruttan, Regents Professor Emeritus, Dept. of Applied Economics, Univ. of Minnesota

December 6, 2000

Seminar

“Jolly Green Giants: The New 'Benign Dictators' of the South-North Food Trades”

Dr. Susanne Freidberg, Bunting Fellow, Radcliffe Inst. for Advanced Study

December 5, 2000

Seminar

“India's Energy Innovation System”

Ambuj Sagar, Research Fellow, BCSIA

December 4, 2000

Lecture

“U.S. Research Policy: A Status Report”

Dr. Mary L. Good: Donaghey Professor and Dean, Donaghey College of Information Science and Systems Engineering, University of Arkansas at Little Rock; President, American Association for the Advancement of Science

November 29, 2000

Seminar

“Technological Innovation and Sustainability: Taking the Natural Step Toward a New Triple Bottom Line”

Terry Gips, President, Sustainability Associates

November 28, 2000

Seminar

“Public Participation in Nuclear Plant Decommissioning”

Darryl Farber, Research Fellow, BCSIA

November 27-28, 2000

Conference

“Basic Research in the Service of Public Objectives,” Washington DC

November 21, 2000

Seminar

“Energy Technology Innovation in China”

Jimin Zhao, Research Fellow, BCSIA

November 16, 2000

Lecture

“Genomic Research, Narrow and Broad Views”

Andrew Murry, Professor of Biology & Director of the Center for Genomic Research, Harvard University

November 15, 2000

Seminar

“Issues in the Introduction of Transgenic Fish”

Mr. Elliot Entis, Chief Executive Officer, A/F Protein, Inc., Waltham

November 14, 2000

Seminar

“Spent Fuel Storage Dilemmas in the United States”

Allison Macfarlane, Research Fellow, BCSIA

November 10, 2000

Seminar

“Biotechnology in India: Promises and Perceptions”

Mr. Sharad Pawar, President, National Congress Party; former Defense Minister, Mumbai, India

November 8, 2000

Seminar

“Science, Environment, and International Trade: The Experience of NAFTA”

Ms. Janine Ferretti, Executive Director, North American Commission for Environmental Cooperation

November 7, 2000

Seminar

“National Innovation Systems in Latin America”

Adolfo Chiri, Research Fellow, BCSIA

November 2, 2000

Seminar

“Science, Culture and Commerce: the Anthropology of Biopharmaceuticals”

Dr. Paul Rabinow, Professor of Social Anthropology, Univ. of Cal. Berkeley

November 1, 2000

Seminar

“How Far Away is Africa? Technological Spillovers to Agriculture and Productivity”

Professor Daniel Johnson, Department of Economics, Wellesley College, Wellesley

October 31, 2000

Seminar

“Controls on Nuclear Weapons and Materials in New Nuclear Weapon States”

Nathan Busch, Research Fellow, BCSIA

October 25, 2000

Seminar

“Fish Farming, World Fish Supplies, and Transgenic Fish”

Rebecca Goldberg, Ph.D., Senior Scientist, Environmental Defense, NYC

October 24, 2000

Seminar

“Clean Coal Technology in India and Prospects for U.S.-Indian Cooperation”

A. Gopalakrishnan, Research Fellow, BCSIA

October 17, 2000

Seminar

“The Openness-Secrecy Tension in Arms Control Assessments and Advice: An Update from the Trenches”

John Holdren, Director, STPP, BCSIA

October 12, 2000

Seminar

“Shaping the Nuclear Threat Initiative: Progress and Prospects”

Matthew Bunn, Deputy Dir., STPP, BCSIA

October 11, 2000

Seminar

“Security in South Asia”

Samina Ahmed, STPP-MTA / ISP Fellow, and David Cortright

October 3, 2000

Seminar

“Research Emphases in the Energy Technology Innovation Project”
John Holdren, Dir., STPP and Vicki Norberg-Bohm, Exec.Dir., ETIP/ STPP, BCSIA

September 26, 2000

Seminar

“Research Emphases in the Managing the Atom Project”

John Holdren, Dir., STPP, and Jennifer Weeks, Exec. Dir., MTA/ STPP, BCSIA

September 25, 2000

Seminar

“Recalcitrance in GMO Policy Making”

Jim Dratwa, Research Fellow, Fonds National de la Recherche Scientifique Bruxelles, Belgium

September 22-23, 2000

Conference

“International Conference on Biotechnology in the Global Economy: Science and the Precautionary Principle”

Kennedy School of Government at Harvard University

September 20, 2000

Seminar

“Biosafety Regulation and Its Consequences for Rural Development in Mexico”

Professor Amanda Galvez, Dept. Alimentos y Biotecnologia,, Facultad de Quimica, Universidad Nacional Autonoma de Mexico and Professor Michelle Chauvet, Dept.Sociologia, Universidad Autonoma Metropolitana, Mexico

September 19, 2000

Seminar

“Seminar Introduction and Planning”

All participants

September 13, 2000

Seminar

“Intellectual Property Protection and Public Health: The Case of AIDS Drugs and the HIV Situation in Africa”

Professor Richard Laing, Department of International Health, Boston University School of Public Health

September 6, 2000

Seminar

“Biotechnology and Liability Insurance: The Power of Public Risk Perception”

Thomas Epprecht, Ph.D., Risk Expert, Swiss Reinsurance Company, Zurich, Switzerland

STRENGTHENING DEMOCRATIC INSTITUTIONS PROJECT

SDI CONFERENCES

These events represent the culmination of work related to SDI’s principal research strands: 1) the Caspian Studies Program, which has the primary goal of locating the Caspian region on the maps of the minds of the American policy-making community as an area in which the US has important national interests and where US policy can make major differences, and 2) the Democratization Strand which, ten years after

the collapse, continues to analyze the important transformations in the countries of the former Soviet Union.

October 5-7, 2000

The Fourth Annual U.S.-Russian Investment Symposium: "New Leadership, New Opportunities"

The theme of the Fourth Annual U.S. - Russian Investment Symposium, "New Leadership – New Opportunities," accurately described the thrust and tone of our largest and most successful symposium to date. By waiting for the election and installation of the new Russian Government and the first signs of dynamic change in the Russian economy, the symposium was able to take advantage of the trends already becoming evident in defining new opportunities. The symposium was co-sponsored by the Belfer Center for Science and International Affairs, the Conference Board, The U.S.-Russian Business Council, and The Financial Times, along with excellent support from our Russian partners "Commonwealth" and the Russian Government and Organizing Committee. Special recognition is due to the BISNIS element of the Department of Commerce for their active participation in this event. The Boston Sheraton Hotel proved an excellent venue for the gathering. This year's event drew some 600 participants from U.S. and Russia, as well as select spokespersons from Asia and Europe.

October 22 & 23, 2000

"U.S.-Russian Relations: Implications for the Caspian Region"

Held on the eve of the U.S. Presidential elections, the conference brought together security studies specialists, experts on the Caspian region, and past and present U.S. and Russian policymakers for a lively and candid debate about the respective policies of the U.S. and Russia toward the region; there were also discussions about the impact of great and regional power rivalry on the state of conflict, stability, and development.

November 6 & 7, 2000

"International Energy Security and Regional Instabilities – Strategic Perspectives of Globalisation, Geopolitics, and the Regional Power Balance at the Beginning of the 21st Century"

The Belfer Center's Caspian Studies Program and International Security Program co-sponsored with the German Council for Foreign Relations (DGAP) an international conference in Berlin in November dealing with energy security. The conference focused on international energy market trends, issues affecting energy security, and specific trends in the Caspian Region and the Middle East. The Harvard - U.S. delegation to the conference included John C. Reppert, BCSIA's Executive Director for Research; Steven E. Miller, ISP Director; Brenda Shaffer, CSP Research Director; Patrick Clawson of the Washington Institute for Near East Policy; and Lucian Pugliese of LPI Consulting.

The conference participants came from a variety of countries in Europe and beyond and included policy-makers, business executives, think-tank members, and academic researchers, all dealing with different aspects of energy security.

CASPIAN STUDIES PROGRAM EVENTS AND SEMINAR SERIES

August 24, 2000

Wexner Fellows from Israel and USACC Fellows from Azerbaijan at the Kennedy School of Government for 2000-2001

"Mutual Perceptions & Relations: Israel & Azerbaijan"

September 14, 2000

Jonathan Cohen, Conciliation Resources, London

"The Georgia-Abkhazia Peace Process"

September 18, 2000

Tom de Waal, BBC World Service

"Nagorny Karabagh: Is a Solution Imminent?"

September 20, 2000

Bruno Coppetiers, Vrije Universiteit Brussel, Brussels
“Federalization & Conflict Resolution in the South Caucasus”

November 16, 2000

Arzu Abdullayeva, Azerbaijan National Committee, Helsinki Citizens’ Assembly
Ida Kuklina, Committee of Soldiers’ Mothers of Russia
Fatima Yandieva, Fund for Repressed Peoples and Civilians in the Northern Caucasus
“Civil Society and Peace-building in the North and South Caucasus”

December 13, 2000

Ambassador John Wolf, former Special Advisor to the President and Secretary of State for Caspian Basin Energy Policy
“The U.S. as a Catalyst in the Caspian Region”

April 10, 2001

Thomas Goltz, journalist and author of *Azerbaijan Diary*
“Sea of Instability: Caspian Politics and Pipelines”

April 11, 2001

Ambassador Elizabeth Jones, Senior Advisor for Caspian Basin Energy Diplomacy, US Department of State
“US Caspian Energy Diplomacy: What Has Changed?”

April 23, 2001

Ambassador Carey Cavanaugh, Special Negotiator for the Nagorno-Karabagh Conflict, US State Department
Professor Hamlet Isaxanli, President and Founder of Khazar University in Baku, Azerbaijan
Professor Ronald Suny, University of Chicago
“Negotiations on Nagorno-Karabagh: Where Do We Go from Here?”

April 25, 2001

Professor Hamlet Isaxanli, President and Founder of Khazar University in Baku, Azerbaijan
“Current Trends in Education in Azerbaijan”

May 2, 2001

Professor Douglas Blum, Providence College
Carol Saivetz, Davis Center for Russian Studies and AAASS, Harvard University
“Fishing in Troubled Waters?: Russia’s Caspian Policy”

May 11, 2001

Dr. Svante Cornell, fellow with the Central Asia-Caucasus Institute at the School of Advanced International Studies at Johns Hopkins University
Chingiz Mammadov, Senior Program Officer at the National Democratic Institute in Baku, Azerbaijan
“Azerbaijan: Between Authoritarianism and Democracy”

May 24, 2001

Mr. Irakli Machavariani, Personal Representative of the President of Georgia on Political Problems of National Security and Conflict Resolution, at the State Chancellery of Georgia.
“Conflicts in Georgia: Effects on Energy transport and Regional Security”

June 28, 2001

Kazim Azimov, Visiting Professor at the Department of Sociology at Baku State University in Azerbaijan and Associate of the Caspian Studies Program
“Internal and External Dimensions of Ethnic Conflict in the Caucasus”

DEMOCRATIZATION STRAND EVENTS AND SEMINAR SERIES

Year Round:

Weekly screenings of Russian television station NTV’s programs; the political satire “Kukly” (“Puppets”) and news program “Itogi,” for Russian speaking members of the Harvard and local community.

September 21, 2000

Mr. Valery Airapetov Member, Yabloko Party; deputy assistant in State Duma, Moscow

Mr. Vasily Anisimkov Public Prosecutor, Moscow Regional Prosecutor's Office

Mr. Viktor Kiselyov Member, Yabloko Party; Chairman, St. Petersburg Council on Municipal Education Ms. Irina Kuzmina Press Secretary of the St. Petersburg branch of the Yabloko Party

Ms. Irina Kutuykhina Member, Yabloko Party, and City Council Deputy in Miass, Chelyabinsk Region

“Is Democracy Doomed in Russia? Views from Yabloko and the Union of Right Forces”

December 6, 2000

Film showing and discussion, “Pokojanie” (“Repentance”) for Russian speaking members of the Harvard and local community.

December 18, 2000

Dr. Ivan Zassoursky, journalist and researcher, Moscow State University and Senior Research Associate, SUNY Center on Russia and the United States

“Reconstructing Russia”

January 18, 2001

Michael McFaul, Senior Associate at the Carnegie Endowment for International Peace and Assistant Professor at Stanford University

“Russian Democracy: Is there a future?”

January 31, 2001

Lev Ponomarev, Executive Director of the All-Russian movement "For Human Rights," Editor-in-Chief of the newspaper "For Human Rights."

“Human Rights in Putin's Russia “

February 5, 2001

SDI Research meeting with NGO Development Specialists from Tomsk, Russia

Tatiana Agashkina, Women’s Club “Personal Connection”

Artem Bureev, International Association Against Drug Use and Trafficking

Oleg Dorokhin, Tomsk Oblast Duma Public Relations and Information Department

Valentina Kristopina, Union of Business and Professional Women

Doriana Litviniuk, “Tereza” charitable organization

Aleksei Safronov, “Union for Future” veterans’ organization

Julia Semenova, Doctor’s Association of Tomsk

Tatiana Sukhanova, Center for Young People and Children “Our Generation”

Marina Surodeeva, Tomsk branch, Russian Family Planning Association

Marina Iakuba, Olympic Center for Gifted Children

Tatiana Kozhvnikova, Association of Student Educational Groups

February 7, 2001

SDI Roundtable discussion with Veronika Sivkova, Editor of the social and economic section of Russian weekly newspaper “Argumenti i Fakti”

February 20, 2001

SDI Research discussion with Steve Grant, Chief of the Russia, Ukraine, and Commonwealth Branch at the State Department Office of Research

March 7, 2001

Mitchell Orenstein, SDI Fellow and Assistant Professor at the Maxwell School of Syracuse University
“Strengthening Public Administration Education in Russia”

April 18, 2001

Irina Ignatieva, Project Coordinator, Banking on Russian Women Project, Women and Public Policy Program
“Banking on Russian Women: Investing in Stability”
Co-Sponsored with the Women and Public Policy Program at the Kennedy School

May 7, 2001

Ruben Vardanian, President and CEO of Investment Bank Troika Dialog
“Russian Corporate Governance: Reality, Perception, Risk and Reward”

May 9, 2001

Mitchell Orenstein, SDI Fellow and Assistant Professor at the Maxwell School of Syracuse University
David Woodruff, Associate Professor of Political Science at MIT
“Planning Pension Reform in Russia”

May 10, 2001

Vladimir Boxer, Fellow, Strengthening Democratic Institutions Project
Timothy Colton, Director, Davis Center for Russian Studies, Harvard University
Sarah Mendelson, Assistant Professor of International Politics at the Fletcher School for Law and Diplomacy, Tufts University
General John Reppert, Executive Director of Research at the Belfer Center for Science and International Affairs
“Putin's First Year: How Good, How Bad?”
Co-Sponsored with the Davis Center for Russian Studies at Harvard University

May 30, 2001

Dr. Emil Pain, Galina Starovoitova Fellow on Human Rights and Conflict Resolution at the Kennan Institute/
Woodrow Wilson Center
“Putin's Plans for Russia: How Realistic Are They?”

June 1, 2001

Lev Ponomarev, Executive Director of the All-Russian movement “For Human Rights,” Editor-in-Chief of the newspaper “For Human Rights”
Sergei Pashin, Honored Lawyer of the Russian Federation, Former Moscow City Court Judge, and Associate Professor at the Institute of Youth
“Judicial Reform and Human Rights in Russia”

June 18, 2001

Vyacheslav Igrunov, Deputy in the Russian State Duma, Yabloko Party faction
“The Future of Russian Democratic Development”

WPF PROGRAM ON INTRASTATE CONFLICT, CONFLICT PREVENTION AND CONFLICT RESOLUTION

In fulfilling its mission to understand and prevent intrastate conflict, the WPF Program sponsors meetings, conferences, and occasional lectures aimed at bringing together academics, policymakers, and diplomats to discuss ways to move toward peace in specific conflicts, as well as larger issues in the area of conflict prevention.

October 11, 2000

“Truth Commissions: The Relevance of the Truth Commission Method to Resolving Situations of Extreme Conflict”

A forum at the Kennedy School chaired by Robert I. Rotberg. Panelists included David Crocker, Brian Hehir, Philip Heymann, Michael Ignatieff, Charles Maier, and Martha Minow.

October 24, 2000

“Restarting and Sustaining Growth and Development in Tanzania”

A seminar at the Kennedy School with Professor Mwangi Kimenyi, Director, Kenya Institute of Public Policy Research and Analysis in Nairobi and Professor Joseph Semboja, Director, Research on Poverty Alleviation, Dar es Salaam.

November 15, 2000

“Managing Conflict Seriously: Conflict Prevention Capacity, Methods, and Needs”

A seminar at the Kennedy School with David Carment, WPF Research Fellow, Albrecht Schnabel, United Nations University, and Robert Rotberg, Director, WPF Program.

January 19-21, 2001

“Failed States: Why States Fail and How to Resuscitate Them – Meeting II”

A conference at the Kennedy School with 30 participants, chaired by Robert I. Rotberg.

February 14, 2001

“Battling Mugabe’s Dictatorship in Zimbabwe”

A seminar at the Kennedy School with Gibson Sibanda, Vice President of Zimbabwe’s opposition Movement for Democratic Change.

May 3, 2001

“Burma Under and After the Military”

A seminar at the Kennedy School with Christina Fink, author of *Living Silence: Burma Under Military Rule* (2001).

May 4-5, 2001

“Peacekeeping and Peace building: Building on the Brahimi Report, Next Steps”

A conference at the Kennedy School with 40 participants, chaired by Robert I. Rotberg.

June 22, 2001

“A Conversation with Morgan Tsvangirai”

A seminar at the Kennedy School with Morgan Tsvangirai, President of Zimbabwe’s Movement for Democratic Change.

June 29 – July 1, 2001

“Failed States: Why States Fail and How to Resuscitate Them – Meeting III”

A conference at the Kennedy School with 30 participants, chaired by Robert I. Rotberg.

Publications

Graham T. Allison, "Enough already! Don't Elian-ize the presidency," *Boston Globe*, 16 November 2000.

Graham T. Allison, "Impact of Globalization on National and International Security" chapter in *Governance in a Global World*, Joseph S. Nye, Jr. and John D. Donahue, editors, 2000.

Graham T. Allison, "'Thirteen Days' and its ageless lessons for tomorrow," *Boston Globe*, 18 February 2001.

Graham T. Allison, "A Missed Opportunity in the Mideast?" *Boston Globe*, 31 January 2001.

Graham T. Allison, "A Partisan Panel Scatters Poppycock," *LA Times*, 25 September 2000.

Graham T. Allison, "Russia's Tragedy – and ours," *Boston Globe*, 23 August 2000.

Graham T. Allison, "U.S. Needs a Post-IMF Russia Policy." *The Wall Street Journal*, 18 June 2001 with Paul Volcker.

Graham T. Allison, "U.S.-Russian Dialogue Is Needed to Head Off a New Cold War," *International Herald Tribune*, 3 April 2001 with Sergei Karaganov

Graham T. Allison, *Realizing Human Rights: Moving from Inspiration to Impact* with co-editor Samantha Power, October 2000.

Graham T. Allison, "Russia's 'Loose Nukes'" *Harvard Magazine* September-October 2000.

BCSIA (Diane McCree, ed.). "BCSIA Annual Report, 2000-2001." BCSIA, 2001.

ENVIRONMENT AND NATURAL RESOURCES PROGRAM

ENRP DISCUSSION PAPERS

Lee, Henry, Philip Voroboyov, and Christiane Breznick. "Entering Russia's Power Sector: Challenges in Creating a Credible Carbon Trading System." BCSIA Discussion Paper 2001-09. June 2001.

Levitt, James and Charles H. W. Foster. "Reawakening the Beginner's Mind: Innovation in Environmental Practice." BCSIA Discussion Paper 2001-07. June 2001.

Foster, Charles H. W. and James S. Hoyte. "Preserving the Trust: The Founding of the Massachusetts Environmental Trust." BCSIA Discussion Paper 2001-03. March 2001.

Coglianesse, Cary. "Is Consensus an Appropriate Basis for Regulatory Policy?" BCSIA Discussion Paper 2001-02. February 2001.

Kates, Robert W., William C. Clark, Robert Corell et al. "Sustainability Science." BCSIA Discussion Paper 2000-33. December 2000.

Guston, David H., William Clark, Terry Keating, David Cash, Susanne Moser, Clark Miller, and Charles Powers. "Report of the Workshop on Boundary Organizations in Environmental Policy and Science." BCSIA Discussion Paper 2000-32. December 2000.

Clark, William C. "America's National Interests in Promoting a Transition Toward Sustainability." BCSIA Discussion Paper 2000-27. November 2000.

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Jaffe, Adam B., Richard G. Newell, and Robert N. Stavins. "Technological Change and the Environment." BCSIA Discussion Paper 2000-25. October 2000.

Gupta, Aarti. "Governing Biosafety in India: The Relevance of The Cartagena Protocol." BCSIA Discussion Paper 2000-24. October 2000.

Eckley, Noelle. "From Regional to Global Assessment: Learning from Persistent Organic Pollutants." BCSIA Discussion Paper 2000-23. October 2000.

Keykhah, Mojdeh. "Global Hazards and Catastrophic Risk: Assessments, Practitioners and Decision Making in Reinsurance." BCSIA Discussion Paper 2000-22. October 2000.

Ogunseitán, Oladele A., "Framing Vulnerability: Global Environmental Assessments and the African Burden of Disease." BCSIA Discussion Paper 2000-21. October 2000.

Betsill, Michele M. "Localizing Global Climate Change: Controlling Greenhouse Gas Emissions in U.S. Cities." BCSIA Discussion Paper 2000-20. September 2000.

Patt, Anthony. "Communicating Probabilistic Forecasts to Decision Makers: A Case Study of Zimbabwe." BCSIA Discussion Paper 2000-19. September 2000.

Lund, David C. "Regional Abrupt Climate Change Assessment in the U.S.: Comparing the Colorado and Columbia River Basins." BCSIA Discussion Paper 2000-18. September 2000.

Biermann, Frank. "Science as Power in International Environmental Negotiations: Global Environmental Assessments Between North and South." BCSIA Discussion Paper 2000-17. September 2000.

Krueger, Jonathan. "Information in International Environmental Governance: The Prior Informed Consent Procedure for Trade in Hazardous Chemicals and Pesticides." BCSIA Discussion Paper 2000-16. September 2000.

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Foster, Charles H.W. and William B. Meyer. "The Harvard Environmental Regionalism Project." BCSIA Discussion Paper 2000-11. December 2000.

Cash, David W. "In Order to Aid in Diffusing Useful and Practical Information...': Cross-scale Boundary Organizations and Agricultural Extension." BCSIA Discussion Paper 2000-10. September 2000.

Cash, David W. "Distributed Assessment Systems: An Emerging Paradigm of Research, Assessment and Decision-making for Environmental Change." BCSIA Discussion Paper 2000-06. 2000.

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The Social Learning Group (William C. Clark, Jill Jaeger, Josee van Eijndhoven, and Nancy M. Dickson, eds.). 2001. *Learning to Manage Global Environmental Risks - Vol. 1: A Comparative History of Social Responses to Climate Change, Ozone Depletion, and Acid Rain. Vol. 2: A Functional Analysis of Social Responses to Climate Change, Ozone Depletion, and Acid Rain.* Cambridge, Mass.: The MIT Press.

Clark, William C. 2000. "Environmental Globalization." In *Governance in a Globalizing World*, edited by Joseph S. Nye, Jr., and John D. Donahue, 86-108. Washington, D.C.: Brookings Institution Press.

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BOOKS AND REPORTS

Lewis M. Branscomb and Philip Auerswald, *Taking Technical Risks: How Innovators, Executives, and Investors Manage High Tech Risks* (Cambridge, Mass.: MIT Press, 2001).

Jane E. Fountain, *Women in the Information Age* (Cambridge, U.K.: Cambridge University Press, forthcoming 2002).

Jane E. Fountain, *Building the Virtual State: Information Technology and Institutional Change* (Washington, D.C.: Brookings Institution Press, 2001).

Brian Kahin and Hal R. Varian, eds., *Internet Publishing and Beyond: The Economics of Digital Information and Intellectual Property* (Cambridge: MIT Press, 2000).

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Viktor Mayer-Schönberger, Mag. Frans Galla, and Markus Fallenbock, *Das Recht der Doman Namen* (Wien, Austria: Manzsche Verlags und Universitätsbuchhandlung, 2001).

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Peng Hwa Ang, "Why the Internet Will Make Asia Freer," *Harvard Asia Quarterly* (forthcoming 2001).

Peng Hwa Ang, "Internet and the Printing Press: Parallels and Paradigms," Conference proceedings of the Internet Society Annual Conference, Stockholm, Sweden, June 5-9, 2001 (forthcoming 2001).

Nolan Bowie, "Bridging the Digital Divide," *Leading the Way*, the magazine of the United Way of Massachusetts Bay (February 2001), 8-12.

Lewis M. Branscomb, "Managing Science-based Industrial Innovation," *UNESCO Courier* (November 2000).

Lewis M. Branscomb, "Technological Innovation," in Paul Baltes and Neil Smelser, eds., *International Encyclopedia of the Social and Behavioral Sciences* (London: Elsevier, forthcoming 2001).

Lewis M. Branscomb and David Hart, "What Future for Science and Technology After This Autumn's U.S. Elections?" *Nature* (October 5, 2000).

Jane E. Fountain, "An Institutional Analysis of Gender and Technology," in Robin C. Ely and Maureen Scully, eds., *Gender and Management* (Blackwell, forthcoming 2001).

Jane E. Fountain, "Paradoxes of Public Sector Customer Service," *Governance: An International Journal of Policy and Administration*, 14, no. 1 (January 2001), 55-73.

Jane E. Fountain, "The Virtual State: Transforming American Government?" *National Civic Review* (forthcoming 2001).

Jane E. Fountain and Carlos A. Osorio-Urzuza, "Public Sector: Early Stage of a Deep Transformation," in The Brookings Task Force on the Internet, *The Economic Payoff from the Internet Revolution* (Washington, D.C.: Brookings Institution Press, 2001).

Deborah Hurley, "Foreign Policy in the Ubiquitous Information Environment," in *Science and Diplomacy: The State of Science at the Department of State* (American Association for the Advancement of Science, December 2000).

Deborah Hurley, "The New Spatial Order? Technology and Urban Development," Chairman's Roundtable Dialog, Lincoln Institute of Land Policy (June 2001).

Deborah Hurley and Viktor Mayer-Schönberger, "Information Policy and Governance," in Joseph S. Nye, Jr. and John D. Donahue, eds., *Governance in a Globalizing World* (Brookings Institution Press, December 2000).

Viktor Mayer-Schönberger, "The Authority of Law in Times of Cyberspace," *Journal of Law, Technology & Policy* (June 2001).

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Viktor Mayer-Schönberger, "Recht offen: Plädoyer für ein Informationsrecht im neuen Jahrtausend," in Manfred Jochum, ed., *Elektronik und Urkunde - Elektronisches Dokument und Rechtssicherheit* (2000), 45.

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INTERNATIONAL SECURITY PROGRAM

INTERNATIONAL SECURITY

Volume 25 (Summer 2000–Spring 2001)

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Bernstein, Barton J., "Understanding Decisionmaking, U.S. Foreign Policy, and the Cuban Missile Crisis: A Review Essay," 25:1 (Summer 2000), pp. 134-164.

Brooks, Stephen G., and William C. Wohlforth, "Power, Globalization, and the End of the Cold War: Reevaluating a Landmark Case for Ideas," 25:3 (Winter 2000/2001), pp. 5-53.

Burr, William, and Jeffrey T. Richelson, "Whether to 'Strangle the Baby in the Cradle': The United States and the Chinese Nuclear Program, 1960-64," 25:3 (Winter 2000/2001), pp. 54-99.

Byman, Daniel L., and Kenneth M. Pollack, "Let Us Now Praise Famous Men (and Women): Restoring the First Image," 25:4 (Spring 2001), pp. 107-146.

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Cooley, Alexander, "Imperial Wreckage: Property Rights, Sovereignty, and Security in the Post-Soviet Space," 25:3 (Winter 2000/2001), pp. 100-127.

Copeland, Dale C., "The Constructivist Challenge to Structural Realism: A Review Essay," 25:2 (Fall 2000), pp. 187-212.

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Feaver, Peter D., "Correspondence: Brother, Can You Spare a Paradigm? (Or Was Anybody Ever a Realist?)" [re. Legro and Moravcsik 24:2], 25:1 (Summer 2000), pp. 165-169.

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Hellmann, Gunther, "Correspondence: Brother, Can You Spare a Paradigm? (Or Was Anybody Ever a Realist?)" [re. Legro and Moravcsik 24:2], 25:1 (Summer 2000), pp. 169-174.

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Lieber, Keir A., "Grasping the Technological Peace: The Offense-Defense Balance and International Security," 25:1 (Summer 2000), pp. 71-104.

Martin, Susan B., "Correspondence: Responding to Chemical and Biological Threats" [re. Sagan 24:4], 25:4 (Spring 2001), pp. 193-198.

Mendelson, Sarah E., "Democracy Promotion and Russia: A View from the Campaign Trail," 25:4 (Spring 2001), pp. 68-106.

Moravcsik, Andrew, see Legro, Jeffrey W. and Andrew Moravcsik.

Mueller, John, "The Banality of 'Ethnic War'," 25:1 (Summer 2000), pp. 42-70.

Mueller, John, "Correspondence: The Causes of Conflict" [reply to Simons], 25:4 (Spring 2001), pp. 187-192.

O'Hanlon, Michael, "Why China Cannot Conquer Taiwan," 25:2 (Fall 2000), pp. 51-86.

Pollack, Kenneth M., see Byman, Daniel L., and Kenneth M. Pollack.

Reilly, Benjamin, "Democracy, Ethnic Fragmentation, and Internal Conflict: Confused Theories, Faulty Data, and the 'Crucial Case' of Papua New Guinea," 25:3 (Winter 2000/2001), pp. 162-185.

Reiter, Dan, "NATO Enlargement and the Spread of Democracy," 25:4 (Spring 2001), pp. 41-67.

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Schweller, Randall L., "Correspondence: Brother, Can You Spare a Paradigm? (Or Was Anybody Ever a Realist?)" [re. Legro and Moravcsik 24:2], 25:1 (Summer 2000), pp. 174-178.

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Biographies

BOARD OF DIRECTORS

Graham Allison is the Douglas Dillon Professor of Government at Harvard University and Director of the Belfer Center for Science and International Affairs. Under the Clinton Administration, Dr. Allison served as Assistant Secretary of Defense for Policy and Plans and coordinated DOD strategy and policy towards Russia, Ukraine, and the other states of the former Soviet Union. He continues as Special Advisor to the Secretary of Defense. As Dean from 1977 to 1989, he built Harvard's John F. Kennedy School of Government. Under his leadership, a small, undefined program grew twenty-fold to become a major professional school of public policy and government. At the end of his tenure, the School had a faculty of more than 100, 750 full-time graduate students, 700 participants in executive programs, and eight major problem-solving research centers. Dr. Allison's teaching and research focuses on American foreign policy; defense policy; U.S. relations with Russia, Ukraine, and other newly independent states of the former Soviet Union; and the political economy of transitions to economic and political democracy. Dr. Allison has authored or co-authored more than a dozen books and 100 articles, including five recent books: *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material* (1996); *Cooperative Denuclearization: From Pledges to Deeds* (1993); *Beyond Cold War to Trilateral Cooperation in the Asia-Pacific Region* (1992); *Rethinking America's Security: Beyond Cold War to a New World Order* (1992); and *Window of Opportunity: The Grand Bargain for Democracy in the Soviet Union* (1991). His first book, *Essence of Decision: Explaining the Cuban Missile Crisis*, first published in 1971, and significantly revised and re-issued in 1999, ranks among the bestsellers in political science, with more than 200,000 copies in print.

Dr. Allison has been an active advisor and consultant to agencies of government, beginning with the Department of Defense in the 1960's. He was Special Advisor to the Secretary of Defense from 1985-87 and has been a member of the Secretary of Defense's Defense Policy Board for Secretaries Weinberger, Carlucci, Cheney, and Perry. In 1989-90, he served as Vice Chairman of JCS Chairman Crowe's Planning Committee on Strategy. Dr. Allison was a founding member of the Trilateral Commission, a Director of the Council on Foreign Relations, and has been a member of public committees and commissions, among them Massachusetts Governor Weld's Task Force on Defense and Technology and the Carnegie Endowment's Commission on Government Renewal. Dr. Allison has served as a Director of the Getty Oil Company, New England Securities, the Taubman Companies, and Belco Oil and Gas, as well as a member of the Advisory Boards of Chemical Bank, Hydro-Quebec, and the International Energy Corporation. Dr. Allison was born and raised in Charlotte, North Carolina. He was educated at Davidson College; Harvard College (B.A., Magna Cum Laude, in History); Oxford University (B.A. and M.A., First Class Honors in Philosophy, Politics, and Economics); and Harvard University

(Ph.D. in Political Science). He has received honorary doctorates from Davidson College, Uppsala University (Sweden), and the University of North Carolina (Wilmington).

Robert D. Blackwill is the current Ambassador to India. A former lecturer in International Security at Harvard University's John F. Kennedy School of Government and Associate Dean of the Kennedy School, he was also faculty chairman of the School's Executive Programs for U.S. and Russian General Officers and for members of the Russian State Duma; of the Executive Program for Senior Chinese Military Officers; and of the Kennedy School's Initiative on U.S. China relations. He is an adjunct senior fellow at the Council on Foreign Relations in New York; on the board of International Security; a member of the International Institute of Strategic Studies and the National Committee on U.S.-China Relations; on the academic advisory board of the NATO Defense College in Rome; on the advisory council of the Nixon Center for Peace and Freedom; and a consultant to the World Bank, the RAND Corporation and U.S. Government agencies.

He is the author of many articles on European security and East-West relations and co-editor of *Conventional Arms Control and East-West Security* (1989), and *A Primer for the Nuclear Age* (1990). His articles include "The Grand Bargain: The West and the Future of the Soviet Union" with Graham Allison, "The U.S.-German Security Relationship in the 1990's," "Coordinating a New Western Strategy for the 1990s," "The Evolution of U.S.-French Relations," "American Diplomacy and German Unification," "Russia and the West," and "American Leadership in the New Era." His book *New Nuclear Nations* with Albert Carnesale was published in 1993 by the Council on Foreign Relations. Other books include *Damage Limitation or Crisis? Russia and the Outside World* edited with Sergei Karaganov, and *Engaging Russia* with Rodric Braithwaite and Akihiko Tanaka. He is the co-author of "Can NATO Survive?," which appeared in the Spring, 1996, issue of *The Washington Quarterly* and author of *Arms Control and the U.S.-Russian Relationship* (1996). His latest book with Michael Stürmer of Germany's Research Institute for International Affairs is *Allies Divided: Transatlantic Policies for the Greater Middle East* (1997). His most recent publication, *The Future of Transatlantic Relations* (1998) was published by the Council on Foreign Relations.

A career diplomat from 1967, he had previously been a Peace Corps Volunteer in Malawi, Africa. During his foreign service career, he served as Director of West European Affairs on the National Security Council staff; Principal Deputy Assistant Secretary of State for Political-Military Affairs; Principal Deputy Assistant Secretary of State for European Affairs; and U.S. Ambassador and Chief Negotiator at the negotiations with the Warsaw Pact on conventional forces in Europe. He was Special Assistant to President George Bush for European and Soviet Affairs in 1989-90. In December 1990, he was awarded the Commander's Cross of the Order of Merit by the Federal Republic of Germany for his contribution while at the White House to German unification.

Lewis M. Branscomb is Emeritus Director of the Science, Technology, and Public Policy Program, and is Aetna Professor, Emeritus, in Public Policy and Corporate Management. He is Principal Investigator of a number of projects in the fields of information technology policy and both domestic and international science and technology policy more generally. His recent research has produced books that focus on evaluating and redirecting the Clinton-Gore

technology policy with James Keller, on state government science and technology with Megan Jones and Dave Guston, on Korea technology policy with Young-Hwan Choi, and intelligent transportation systems with James Keller. He continues to study research and innovation policy, as well as conduct research on university-industry partnerships in Japan and America.

Harvey Brooks is Benjamin Pierce Professor of Technology and Public Policy, Emeritus, in the Kennedy School of Government; Gordon McKay Professor of Applied Physics, Emeritus, in the Division of Applied Sciences at Harvard University; and emeritus member of the BCSIA Board of Directors. Dr. Brooks graduated from Yale University. He did graduate physics at Cambridge University, England, and at Harvard University, receiving his Ph.D. in physics from Harvard with J. H. Van Vleck in 1940. He was a Junior Fellow in the Society of Fellows at Harvard from 1940 to 1942, and a staff member of the Harvard Underwater Sound Laboratory from 1941 to 1945. He joined General Electric in 1946, where he served as Associate Head of the Knolls Atomic Power Lab. He returned to Harvard in 1950 as Gordon McKay Professor of Applied Physics. From 1957 to 1975 he served as Dean of the Division of Engineering and Applied Physics at Harvard. Besides numerous technical articles in the three scientific fields, he has published a book, *The Government of Science* (MIT Press, 1968) and numerous articles in the field of science policy. In 1957 he founded the *International Journal of the Physics and Chemistry of Solids*, of which he remained Editor-in-Chief until the mid-1970s. Since 1975 he has devoted most of his teaching and research effort to the field of science, technology, and public policy in the Kennedy School of Government. From 1968 to 1972 he was chairman of the university-wide faculty committee for the IBM-funded Program on Technology and Society. Brooks has served on many committees related to science policy, including the President's Science Advisory Committee in the Eisenhower, Kennedy, and Johnson administrations. Dr. Brooks is a member of the National Academy of Sciences, and the National Academy of Engineering, and a Senior Member of the Institute of Medicine. He is a member of the American Philosophical Society, a member and former president of the American Academy of Arts and Sciences, and a member of the Council on Foreign Relations. Most recently Dr. Brooks has been a member of several committees of the National Academy of Engineering dealing with issues of technology in relation to U.S. competitiveness in the world economy. He co-chaired, with Dr. John Foster, the Committee on Technology Policy Options in a Global Economy of the National Academy of Engineering, whose report, "Mastering a New Role: Shaping Technology Policy for National Economic Performance," was released in March 1993. He is also involved in a research program at the Kennedy School dealing with the recasting of national technology policy. He is the author of numerous publications on global environmental policy and risk analysis. Brooks has received six honorary D.Sc. degrees from Kenyon College, Union College, Yale University, Harvard University, Brown University, and the Ohio State University. He is also the 1993 recipient of the Philip Hauge Abelson Prize of the American Academy of Arts and Sciences.

Albert Carnesale is the Chancellor of the University of California, Los Angeles and a member of the BCSIA Board of Directors. Prior to his position at UCLA, he was at Harvard University for 23 years (1974-97), initially as Associate Director of the Center for Science and International Affairs, which later became BCSIA. He served at the John F. Kennedy School of Government as Lucius N. Littauer Professor of Public Policy and Administration, as Academic Dean (1981-91), and as Dean (1991-95). He was Provost of Harvard University from 1994 to 1997. His

research and teaching have focused on international relations and national security policy, with emphasis on issues associated with nuclear weapons and arms control. After earning B.S. and M.S. degrees in Mechanical Engineering at Cooper Union and Drexel University, he earned a Ph.D. in Nuclear Engineering at North Carolina State University. Dr. Carnesale has held positions in industry (Martin Marietta Corporation, 1957-62) and government (U.S. Arms Control and Disarmament Agency, 1969-72). He participated in the U.S. delegation to the Strategic Arms Limitation Talks (1970-72) and led the U.S. delegation to the International Nuclear Fuel Cycle Evaluation (1978-80), a 66-nation study of the relationship between civilian nuclear power and proliferation of nuclear weapons. In academia, Dr. Carnesale was professor at North Carolina State University from 1962-69 and 1972-74. He has consulted and written extensively on international affairs, defense policy, and nuclear energy issues, and has testified often before Congressional committees. He is co-author of *New Nuclear Nations: Consequences for U.S. Policy* (1993); *Fateful Visions: Avoiding Nuclear Catastrophe* (1988); *Superpower Arms Control: Setting the Record Straight* (1987); *Hawks, Doves, and Owls: An Agenda for Avoiding Nuclear War* (1985); and *Living with Nuclear Weapons* (1983). He is a member of the Council on Foreign Relations and of the International Institute for Strategic Studies, and he was a founding editor of the quarterly journal *International Security*.

Ashton B. Carter is Ford Foundation Professor of Science and International Affairs at Harvard University's John F. Kennedy School of Government and Co-Director, with William J. Perry, of the Harvard-Stanford Preventive Defense Project.

From 1993-1996, Carter served as Assistant Secretary of Defense for International Security Policy, where he was responsible for national security policy concerning the states of the former Soviet Union (including their nuclear weapons and other weapons of mass destruction), arms control, countering proliferation worldwide, export controls, and oversight of the U.S. nuclear arsenal and missile defense programs; he also chaired NATO's High Level Group. He was twice awarded the Department of Defense Distinguished Service medal, the highest award given by the Pentagon. Carter continues to serve DoD as an adviser to the Secretary of Defense and as a member of both DoD's Defense Policy Board and Defense Science Board, and DoD's Threat Reduction Advisory Council. From 1998 to 2002, Carter served in an official capacity as Senior Adviser to the North Korea Policy Review, chaired by William J. Perry.

Before his government service, Carter was director of the Center for Science and International Affairs in the Kennedy School of Government at Harvard University and chairman of the editorial board of *International Security*. Carter received bachelor's degrees in physics and in medieval history from Yale University and a doctorate in theoretical physics from Oxford University, where he was a Rhodes Scholar.

In addition to authoring numerous scientific publications and government studies, Carter is the author and editor of a number of books, including *Preventive Defense: A New Security Strategy for America* (with William J. Perry). Carter's current research focuses on the Preventive Defense Project, which designs and promotes security policies aimed at preventing the emergence of major new threats to the United States.

Carter is a Senior Partner of Global Technology Partners, LLC, a member of the Advisory Board of MIT Lincoln Laboratories, the Draper Laboratory Corporation, and the Board of Directors of Mitretek Systems, Inc. He is a consultant to Goldman Sachs and the MITRE Corporation on international affairs and technology matters, a member of the Council on Foreign Relations and the National Committee on U.S.-China Relations, and a fellow of the American Academy of Arts and Sciences.

William Clark is the Harvey Brooks Professor of International Science, Public Policy and Human Development at Harvard University's John F. Kennedy School of Government. Trained as an ecologist, his research focuses on long term social learning to cope with issues arising through the interactions of environment, development and security concerns in international affairs. He has studies underway on the development of better assessment frameworks for use in the management of global environmental change and on the problems of monitoring and evaluating progress towards sustainable development. At Harvard, Clark has served as Vice Chairman of the University Committee on Environment, member of the Steering Committee of the Center for International Affairs, and Director of the Center for Science and International Affairs. Elsewhere, he co-chaired the sustainability transition study of the US National Research Council, and chairs the Design Committee for the Heinz Center's report on the "State of the Nation's Ecosystems." He is co-author of *Redesigning Rural Development* (Hopkins, 1982) and *Adaptive Environmental Assessment and Management* (Wiley, 1978); editor of the *Carbon Dioxide Review* (Oxford, 1982); and coeditor of *The Earth Transformed by Human Action* (Cambridge, 1990), *Sustainable Development of the Biosphere* (Cambridge, 1986), *Learning to Manage Global Environmental Risks* (MIT, 2001), and *Environment* magazine. Clark was awarded the MacArthur Prize in 1983.

Richard Darman is Public Service Professor at Harvard University's John F. Kennedy School of Government. He returned to the School in January 1998, having been a Lecturer in Public Policy and Management from 1977-80. In the intervening years, he served as a member of President Bush's cabinet and Director of the U.S. Office of Management and Budget (1989-93); Deputy Secretary of the U.S. Treasury (1985-87); and Assistant to the President of the United States (1981-85). His prior government experience included service as Assistant Secretary of Commerce in the Ford administration and staff positions at Justice, Defense, and HEW in the Nixon administration. In the private sector, he has been a managing director of Shearson, Lehman Brothers and a partner of The Carlyle Group (a global private investment firm), with which he remains associated as a Senior Advisor. He is a director of several public and private corporations and a trustee of The New England Funds and the Council for Excellence in Government. A graduate of Harvard College and Harvard Business School, and a former Fellow of the Woodrow Wilson International Center for Scholars, he is the author of *WHO'S IN CONTROL? Polar Politics and the Sensible Center* (Simon & Schuster, 1996).

John M. Deutch is an Institute Professor at the Massachusetts Institute of Technology. He served as Director of Central Intelligence from May 1995-December 1996. From 1994-95, he served as Deputy Secretary of Defense and served as Undersecretary of Defense for Acquisition and Technology from 1993-94. John Deutch has also served as Director of Energy Research (1977-79), Acting Assistant Secretary for Energy Technology (1979), and Undersecretary (1979-80) in the United States Department of Energy.

In addition, John Deutch has served on the President's Nuclear Safety Oversight Committee (1980-81); the President's Commission on Strategic Forces (1983); the White House Science Council (1985-89); the President's Intelligence Advisory Board (1990-93); the President's Commission on Aviation Safety and Security (1996); and the President's Commission on Reducing and Protecting Government Secrecy (1996). He currently is a member of the President's Committee of Advisors on Science and Technology (1997) and the Chairman of the President's Commission to Assess the Organization of the Federal Government to Combat the Proliferation of Weapons of Mass Destruction (1998). Dr. Deutch serves as director for the following publicly held companies: Ariad Pharmaceutical, Citicorp, CMS Energy, Cummins, Raytheon, and Schlumberger Ltd.

Dr. Deutch has been a member of the MIT faculty since 1970, and has served as Chairman of the Department of Chemistry, Dean of Science and Provost. Dr. Deutch has published over 120 technical publications in physical chemistry, as well as numerous publications on technology, international security and public policy issues.

Paul Doty is the Founder and Director Emeritus of the Center for Science and International Affairs and Mallinkrodt Professor of Biochemistry, and an emeritus member of the BCSIA Board of Directors. Professor Doty's early scientific work began in the physical chemistry of high polymers but soon gravitated to proteins and nucleic acids. The discovery of the molecular resulting of DNA and its renaturation, on which much of modern recombinant DNA technology rests, is the best known work of his laboratory. He was one of the founding editors of the *Journal of Polymer Science* and the *Journal of Molecular Biology*, and he was a member of the Department of Chemistry during his first 20 years at Harvard. In 1967 he helped found the new Department of Biochemistry and Molecular Biology, serving as its first chairman and Mallinkrodt Professor of Biochemistry. He retired from biochemistry in 1988 and has since been Professor of Public Policy in the Kennedy School of Government. In keeping with his interest in national and international security affairs and arms control that had their origin in his work on the Manhattan Project, Professor Doty became a member of the President's Science Advisory Committee under Kennedy and Johnson, chaired the first committee of the National Academy of Sciences to oversee Soviet-American exchange in science, chaired the American Pugwash Committee in its early days, as well as a Soviet-American Scientists' group examining arms control from 1965-75. In 1973, with the help of the Ford Foundation, he began the Program in Science and International Affairs at Harvard. It developed into the Center for Science and International Affairs in 1978. Professor Doty served as Director of the Center until 1981.

Shai Feldman is Head of the Jaffee Center for Strategic Studies at Tel Aviv University. He served as a Senior Research Fellow at BCSIA until October of 1997 and is a member of the Board of Directors. In 1989 he established and directed the Jaffee Center's project on Security and Arms Control in the Middle East and was a Senior Research Fellow there. Dr. Feldman has written extensively on issues related to Israel's national defense, nuclear policy, proliferation, and arms control, as well as on U.S. policies in the Middle East. He is the author of *Israeli Nuclear Deterrence* and a monograph on *The Future of U.S.-Israeli Strategic Cooperation*. Dr. Feldman has two recent books: *Nuclear Weapons and Arms Control in the Middle East* (MIT Press); and *Bridging the Gap: A New Security Architecture for the Middle East*, co-authored with

the Jordanian scholar Abdullah Toukan. He received his Ph.D. from the Department of Political Science at the University of California at Berkeley.

John P. Holdren is the Teresa and John Heinz Professor of Environmental Policy and Director of BCSIA's Program on Science, Technology, and Public Policy. He is also Professor of Environmental Science and Public Policy in the Department of Earth and Planetary Sciences and member of the Board of Tutors for the undergraduate concentration in Environmental Science and Public Policy. Trained in engineering and plasma physics at MIT and Stanford, he co-founded in 1973 and co-led until 1996 the interdisciplinary graduate-degree program in energy and resources at the University of California, Berkeley. He is a member of the National Academy of Sciences (NAS) and the National Academy of Engineering (NAE), and he chairs the NAS Committee on International Security and Arms Control and the NAS/NAE Committee on US/India Cooperation on Energy. He is also a member of President Clinton's Committee of Advisors on Science and Technology and chair of its Energy Panel. He has been the recipient of a MacArthur Prize, the Volvo Environment Prize, and the Tyler Prize for Environment, among others. In December 1995 he delivered the Nobel Peace Prize acceptance lecture in Oslo on behalf of the Pugwash Conferences on Science and World Affairs, which he served as Chair of the Executive Committee from 1987-97.

Deborah Hurley is the Director of the Harvard Information Infrastructure Project. Hurley was an official (1988-96) of the Organization for Economic Cooperation and Development (OECD) in Paris, France, with responsibility for legal, economic, social, and technological issues related to information and communications technologies, biotechnology, environmental and energy technologies, technology policy, and other advanced technology fields. She was responsible for the drafting, negotiation, and adoption by OECD member countries of the 1992 OECD Guidelines for the Security of Information Systems. Prior to joining the OECD, Hurley practiced computer and intellectual property law (1983-88) in the United States. She carried out a Fulbright study (1989-90) of intellectual property protection and technology transfer in Korea. Hurley graduated from the University of California at Berkeley and received a law degree from UCLA Law School. She is a member of the Advisory Committee to the U.S. State Department on International Communications and Information Policy (and co-chair of its Working Group on Security, Encryption and Export Controls), of the Advisory Committee on International Science of the American Association for the Advancement of Science (AAAS), and of the Advisory Board of the Electronic Privacy Information Center (EPIC). She will serve as Chair of CFP 2001, the Eleventh Conference on Computers, Freedom and Privacy.

Sheila Jasanoff is Professor of Science and Public Policy at the John F. Kennedy School of Government and the School of Public Health. She has written extensively on subjects of science, technology and environmental policy in America, Europe and India. Her publications in these areas include *Controlling Chemicals: The Politics of Regulation in Europe and the U.S.* (co-author), *Risk Management and Political Culture*, *The Fifth Branch: Science Advisers as Policymakers*, and, most recently *Science at the Bar: Law, Science, and Technology in America*. She is currently writing a book on the comparative regulation of biotechnology in the U.S., Britain, and Germany and is principal investigator on the NSF-sponsored project, Sustainable Knowledge about the Global Environment.

Henry Lee is the Jaidah Family Director of the Environment and Natural Resources Program, within the Belfer Center for Science and International Affairs, Faculty Co-Chair of the Kennedy School International Infrastructure Program, and a Lecturer in Public Policy.

Before joining the School in 1979, Lee spent nine years in Massachusetts state government as Director of the State's Energy Office and Special Assistant to the Governor for environmental policy. He has served on numerous state, federal, and private advisory committees on both energy and environmental issues, and is working with private and public organizations, including the Department of Energy, Department of the Interior, U.S. EPA, the National Park Service, the Brazilian National Development Bank, the Inter-American Development Bank and is on the board of several corporations. His research interests have focused on electricity and water privatization, environmental management, global climate change, and the political economy of energy. He is the editor of "Shaping National Responses to Climate Change: A Post-Rio Guide," the report of the Harvard Global Environmental Policy Program and is the author of several research reports on electricity restructuring and the environment, including "Electricity Restructuring and the Environment," a 1995 discussion paper co-authored with Negeen Darani, and the recent paper, "Implementing a Domestic Carbon Tradable Permit System: The Obstacles and Opportunities."

Ernest R. May is Director of the Charles Warren Center for Studies in American History and an authority on the history of international relations. He has been Professor of History since 1963 and Charles Warren Professor of History since 1981. In 1969-72 he was Dean of Harvard College and Associate Dean of the Faculty of Arts and Sciences. He was Director of the Institute of Politics from 1971-74 and Chairman of the Department of History from 1976-79. In 1997-1998 he was on leave, serving as Alfred Vere Harmsworth Professor in the University of Oxford.

Born in Fort Worth, Texas, Professor May holds A.B. and Ph.D. degrees from the University of California at Los Angeles. He is a member of the Council on Foreign Relations and a Fellow of the American Academy of Arts and Sciences. He has been a consultant at various times to the Office of the Secretary of Defense, the National Security Council, the Lawrence Livermore National Laboratory, the National Endowment for the Humanities, the Smithsonian Institution, and committees of the Congress.

His publications include *The World War & American Isolation 1914-17* (1959), *The Ultimate Decision: The President as Commander in Chief* (1960), *Imperial Democracy: The Emergence of America as a Great Power* (1961), *American Imperialism: A Speculative Essay* (1968), *'Lessons' of the Past: The Use and Misuse of History in American Foreign Policy* (1973), *The Making of the Monroe Doctrine* (1975), *A Proud Nation* (1983), *Knowing One's Enemies: Intelligence Assessment Before the Two World Wars* (1985), and with Richard E. Neustadt *Thinking in Time: The Uses of History for Decision-Makers* (1986). In 1988 he and Richard Neustadt received the Grawemeyer Award for Ideas Improving World Order. His most recent publications are *American Cold War Strategy: Interpreting NSC 68* (1993) and with Philip D. Zelikow *The Kennedy Tapes: Inside the White House during the Cuban Missile Crisis*.

In addition to teaching undergraduate courses on the Cold War and the Vietnam War and undergraduate and graduate courses on the history of international relations, Professor May

teaches in the John F. Kennedy School of Government courses on reasoning from history and assessing other governments. In the Kennedy School he also directs an Intelligence Policy Program, studying relationships between intelligence analysis and policy-making.

Matthew Stanley Meselson is the Thomas Dudley Cabot Professor of the Natural Sciences. He received Ph.D. degrees from the University of Chicago in 1951 and from the California Institute of Technology in 1957. He was a research fellow and then Assistant Professor of Physical Chemistry at California Institute of Technology until he joined the Harvard faculty in 1960, where he conducted research primarily in the field of molecular genetics. Currently he is studying mechanisms of molecular evolution. Since 1963 Dr. Meselson has been interested in chemical and biological defense and arms control and has served as a consultant on this subject to various government agencies. He is co-director of the Harvard-Sussex Program on CBW Armament and Arms Limitation and co-editor of its quarterly journal, *Chemical Weapons Convention Bulletin*. Dr. Meselson is a member of the National Academy of Sciences, the American Academy of Arts and Sciences, the American Philosophical Society, the Academie des Sciences (Paris), the Academia Sanctae Clarae (Genoa), the Royal Society (London), the Institute of Medicine, and the Council on Foreign Relations. He has received the Award in Molecular Biology from the National Academy of Sciences, the Eli Lilly Award in Microbiology and Immunology, the Alumni Medal of the University of Chicago, the Public Service Award of the Federation of American Scientists, the Legman Award of the New York Academy of Sciences, the Alumni Distinguished Service Award of the California Institute of Technology, the Presidential Award of the New York Academy of Sciences, a MacArthur Fellowship, the Scientific Freedom and Responsibility Award of the American Association of the Advancement of Science, and the 1995 Thomas Hunt Morgan Medal of the Genetics Society of America. He has also been awarded numerous honorary degrees. Dr. Meselson is presently a member of the Committee on International Security and Arms Control of the U.S. National Academy of Sciences.

Steven E. Miller is Director of the International Security Program at BCSIA, and a member of its Board of Directors. He is also Editor-in-Chief of the quarterly journal *International Security*. Previously he was Senior Research Fellow at the Stockholm International Peace Research Institute and taught Defense and Arms Control Studies at the Massachusetts Institute of Technology. He is co-author of the book, *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, and of *Soviet Nuclear Fission: Control of the Nuclear Arsenal in a Disintegrating Soviet Union*. He is editor and co-editor of numerous books, including *The Perils of Anarchy: Contemporary Realism and International Security*, and *Global Dangers: Changing Dimensions of International Security*.

Joseph S. Nye, Jr. is Dean of the Kennedy School, Don K. Price Professor of Public Policy, and a member of the BCSIA Board of Directors. He joined the Harvard Faculty in 1964, and has served as Director of the Center for International Affairs, Dillon Professor of International Affairs and Associate Dean of Arts and Sciences at Harvard University. From 1977-79 he served as Deputy to the Undersecretary of State for Security Assistance, Science and Technology and chaired the National Security Council Group on Nonproliferation of Nuclear Weapons. In 1993 and 1994 he was chairman of the National Intelligence Council, which coordinates intelligence estimates for the President. In 1994 and 1995 he served as Assistant Secretary of

Defense for International Security Affairs. In all three agencies, he received distinguished service awards. Dr. Nye is a Fellow of the American Academy of Arts and Sciences and the American Academy of Diplomacy, and a member of the Executive Committee of the Trilateral Commission. He has served as Director of the Aspen Strategy Group, Director of the Institute for East-West Security Studies, Director of the International Institute for Strategic Studies, the American representative on the United Nations Advisory Committee on Disarmament Affairs, and a member of the Advisory Committee of the Institute of International Economics. Dr. Nye received his bachelor's degree summa cum laude from Princeton University in 1958. He was a Rhodes Scholar at Oxford University and earned a Ph.D. in political science from Harvard University. In addition to teaching at Harvard, Dr. Nye has also taught for brief periods in Geneva, Ottawa, and London. He has lived for extended periods in Europe, East Africa, and Central America.

John C. Reppert is Executive Director (Research) for the Belfer Center for Science and International Affairs. He joined the Center in 1998 after serving nearly 33 years in the U.S. Army. His military duties included three tours at the U.S. Embassy in Moscow, service as Military Assistant to the Assistant Secretary of Defense for International Security Policy, and as Principal Director of the Office for Russia, Ukraine, and Eurasia, concluding his service as Director of the On-Site Inspection Agency. He is fluent in Russian and has traveled for the last 25 years in all the newly independent states of the former Soviet Union. He received his Ph.D. in International Affairs from George Washington University; his M.A. in Soviet Studies from the University of Kansas; and his M.S. and B.A. in Journalism from Kansas State University. He is a military member of the International Institute of Strategic Studies and the American Association for the Advancement of Slavic Studies.

Robert I. Rotberg is Director of the World Peace Foundation Program on Intrastate Conflict, Conflict Prevention, and Conflict Resolution at the Belfer Center of the Kennedy School of Government, Harvard University and President of the World Peace Foundation. He was Professor of Political Science and History, MIT; Academic Vice President, Tufts University; and President, Lafayette College. He is a Presidential appointee to the Council of the National Endowment for the Humanities and a Trustee of Oberlin College. He is the author and editor of numerous books and articles on U.S. foreign policy, Africa, Asia, and the Caribbean, most recently *Creating Peace in Sri Lanka: Civil War and Reconciliation* (1999), *Burma: Prospects for a Democratic Future* (1998), *War and Peace in Southern Africa: Crime, Drugs, Armies, and Trade* (1998), *Haiti Renewed: Political and Economic Prospects* (1997), *Vigilance and Vengeance: NGOs Preventing Ethnic Conflict in Divided Societies* (1996), *From Massacres to Genocide: The Media, Public Policy and Humanitarian Crises* (1996), and *The Founder: Cecil Rhodes and the Pursuit of Power* (1988).

Robert N. Stavins is the Albert Pratt Professor of Business and Government, and Faculty Chair of the Environment and Natural Resources Program at the John F. Kennedy School of Government, Harvard University. He is a University Fellow of Resources for the Future and the Chairman of the Environmental Economics Advisory Committee of the U.S. Environmental Protection Agency's (EPA) Science Advisory Board, and a Member of: EPA's Clean Air Act Advisory Committee, the Intergovernmental Panel on Climate Change (IPCC), the Board of Directors of the Association of Environmental and Resource Economists, the Board of Directors

of the Robert and Renée Belfer Center for Science and International Affairs, the Editorial Council of The Journal of Environmental Economics and Management, the Board of Editors of Resource and Energy Economics, the Advisory Board of Environmental Economics Abstracts, and the Editorial Board of Economic Issues. He is also a contributing editor of *Environment*, and the Academic Advisor for Environmental Programs of the Foundation for American Communications. He holds a B.A. in philosophy from Northwestern University, an M.S. in agricultural economics from Cornell, and a Ph.D. in economics from Harvard.

Professor Stavins' research has focused on diverse areas of environmental economics and policy, including examinations of: policy instrument choice under uncertainty; competitiveness effects of regulation; design and implementation of market-based policy instruments; diffusion of pollution-control technologies; and depletion of forested wetlands. His current research includes analysis of: technology innovation; environmental benefit valuation; political economy of policy instrument choice; and econometric estimation of carbon sequestration costs. His research has appeared in the *American Economic Review*, *Journal of Economic Literature*, *Journal of Environmental Economics and Management*, *Ecology Law Quarterly*, *Journal of Risk and Uncertainty*, *Resource and Energy Economics*, *The Energy Journal*, *Energy Policy*, *Annual Review of Energy and the Environment*, *Explorations in Economic History*, *Brookings Papers on Economic Activity*, other scholarly and popular periodicals, and several books.

Professor Stavins directed Project 88, a bi-partisan effort co-chaired by former Senator Timothy Wirth and the late Senator John Heinz, to develop innovative approaches to environmental and resource problems. He continues to work closely with public officials on matters of national and international environmental policy. He has been a consultant to the National Academy of Sciences, several Administrations, Members of Congress, environmental advocacy groups, the World Bank, the United Nations, the U.S. Agency for International Development, state and national governments, and private foundations and firms.

Prior to coming to Harvard, Stavins was a staff economist at the Environmental Defense Fund; and before that, he managed irrigation development in the Middle East, and spent four years working in agricultural extension in West Africa as a Peace Corps volunteer.

Stephen M. Walt is the Robert and Renee Belfer Professor of International Affairs at the John F. Kennedy School of Government at Harvard University, where he also serves as Faculty Chair of the International Security Program of the Belfer Center. He was previously Professor of Political Science at the University of Chicago, where he served as Master of the Social Science Collegiate Division and Deputy Dean of Social Sciences. Professor Walt received his B.A. in International Relations from Stanford University and his M.A. and Ph.D in Political Science from the University of California, Berkeley. He was a Research Fellow at Harvard from 1981 to 1984 and Assistant Professor of Politics and International Affairs at Princeton University from 1984 to 1989. He has been a Resident Associate at the Carnegie Endowment for International Peace and a Guest Scholar at the Brookings Institution and has received fellowships from the John D. and Catherine T. MacArthur Foundation, the U.S. Institute of Peace, the Institute for the Study of World Politics, and the Smith Richardson Foundation. He is a member of the Board of Directors of the Bulletin of the Atomic Scientists, on the Editorial Boards of Foreign Policy, Security

Studies, and Journal of Cold War Studies, and has been a consultant for the Institute of Defense Analyses, the Center for Naval Analyses, and the National Defense University. He also serves as Co-Editor of the Cornell Studies in Security Affairs, published by Cornell University Press. He is the author of *The Origins of Alliances* (Cornell, 1987), which received the 1988 Edgar S. Furniss National Security Book Award, and *Revolution and War* (Cornell, 1996). His recent publications include "International Relations: One World, Many Theories" (Foreign Policy, Spring 1998); "The Ties That Fray: Why Europe and America Are Approaching a Parting of the Ways" (The National Interest, Winter 1998/99); "Rigor or Rigor Mortis?: Rational Choice and Security Studies" (International Security, Spring 1999); and "Two Cheers for Clinton's Foreign Policy," (Foreign Affairs, March/April 2000).

John P. White is a faculty member of the John F. Kennedy School of Government, Harvard University. Dr. White has held several senior federal government positions during his career, including U.S. Deputy Secretary of Defense from 1995-97, Deputy Director of the Office of Management and Budget from 1978-81 and Assistant Secretary of Defense, Manpower, Reserve Affairs and Logistics, from 1977-78. Prior to his most recent government service, Dr. White was the Director of the Center for Business and Government at Harvard University and the Chairman of the Commission on Roles and Missions of the Armed Forces.

Dr. White also has extensive private sector experience, having served as Chairman and CEO of Interactive Systems Corporation from 1981-88 and, following its sale to the Eastman Kodak Company in 1988, as General Manager of the Integration and Systems Products Division and a Vice President of Kodak until 1992. Dr. White also spent nine years with The RAND Corporation where he was the Senior Vice President for National Security Research Programs and a member of the Board of Trustees.

Dr. White is currently a Senior Partner of Global Technology Partners, LLC, which, in partnership with DLJ Merchant Banking Partners, specializes in private equity investments in technology, defense, aerospace and related businesses worldwide. He also is a Senior Fellow at The RAND Corporation and a member of the Council on Foreign Relations. He serves as a director of Wang Laboratories and IRG International as well as the Concord Coalition and Center for Excellence in Government. He is a member of the Global Advisory Committee of Mitsubishi Electric Corporation, Tokyo, Japan. Dr. White received a B.S. from Cornell University and earned his M.A. and Ph.D. in economics from the Maxwell Graduate School, Syracuse University.

Shirley Williams has been a Liberal Democrat member of the British House of Lords since 1993. She was a Visiting Professor at the University of Essex in 1994-95, and a member of the Advisory Council to the UN Secretary-General on the Fourth World Women's Conference. She served in the British Cabinet (1974-79) as secretary of state for education and science, secretary of state for prices and consumer protection, and paymaster general, the House of Commons as a Labour MP from 1964-79 and as a Social Democrat MP from 1981-83. She co-founded the Social Democratic Party in 1981 and served as its president from 1982-88. Her published work includes *Politics is for People* (1981), *A Job to Live* (1985), and *Ambition & Beyond Career Paths of American Politicians* (1993) co-edited with Edward L. Lasher, Jr. In 1980, she hosted the BBC-TV series Shirley Williams in Conversation. In 1980 she was a fellow at the Institute

of Politics (IOP), and was interim director in 1989-90. Williams focuses on issues related to the European Union, Central and Eastern Europe, North American politics, and careers in elective politics.

STAFF

Arnold Bogis is the Assistant to the Director and Executive Directors at the Belfer Center for Science and International Affairs. He received his B.A. in Physics from Johns Hopkins University in 1997. Arnold held various administrative positions before coming to Harvard, where he hopes to pursue an advanced degree in International Relations.

Seth Jaffe is a Research Assistant at the Belfer Center for Science and International Affairs. He received his B.A. in Government (Comparative Politics) and Philosophy from Bowdoin College in May of 2000. He spent his junior year abroad in Jerusalem and wrote an honors thesis on the 1993 Israel-PLO Declaration of Principles. Seth will attend an MSC program in political theory at the London School of Economics in 2002. He hopes to ultimately pursue a PhD in political philosophy.

Anne Cushing Jenkins is the Librarian and Web Systems Specialist for the Belfer Center for Science and International Affairs. She has been working in the Harvard library community for six years. Anne previously worked at the Harvard Botany Libraries as a reference and retrospective conversion assistant; and more recently she was the Automation Specialist for Widener Library's Government Documents Division. She is the co-founder of the Boston Area Library Web Managers and the Secretary of the Harvard University Mac Users Group. She has a B.A. in English and Photography from the University of Massachusetts.

Steve Nicolero is the Financial Officer for BCSIA. Prior to joining the Center, Steve worked at the Kennedy School in the Office for Budget and Finance where he was primarily responsible for overseeing the budgets for the School's research centers. Prior to the start of his career at the Kennedy School, Steve worked within the Controller's Office at Tufts University and is a veteran of the U.S. Air Force. Steve holds a B.A. from the University of Maine at Presque Isle.

Peggy Scannell is the Financial Assistant at the Belfer Center for Science and International Affairs. She spent seventeen years working in the Director's Office of Harvard Dining Services before joining the Center in 1989. Previously, she had been quite busy raising a family. Peggy enjoys travelling, most recently she visited Ireland and Las Vegas.

Anya Schmemann is Communications Officer for the Belfer Center for Science and International Affairs. She received a B.A. in Government and an M.A. in Russian Area Studies from Harvard. After graduation she worked at the Council on Foreign Relations in New York City as Assistant Director of the Center for Preventive Action – a Council initiative to study and practice conflict prevention. She coordinated two of the Center's projects on Kosovo/Macedonia and on Uzbekistan/Kyrgyzstan/Tajikistan. After the Council, she moved to the East West Institute, also in New York City, to manage a large research and book publication project on Russia's total security environment. Anya has traveled extensively in the former

Soviet Union and is a member of Women in International Security and the Council on Foreign Relations.

Kathleen Siddell is the Staff Assistant to the Executive Directors. Previously, she worked as an Editorial Associate at Delphi.com. She received a BA in American Studies from Franklin and Marshall College. She graduated from the University of Essex, UK, in 1999 with an MA in International Relations. Her dissertation focused on the affects of gender in foreign policy decision making. She hopes to continue studying the role of women in International Relations.

Alper Tunca is the Administrative Coordinator at the Belfer Center for Science and International Affairs as well as the Assistant to Graham Allison. He received his B.A. in International Relations and French from Boston University in 1997. Previously, Alper worked in U.S. Senator John F. Kerry's Boston office as Assistant to the Senator. Alper hopes to pursue an advanced degree in International Relations focusing on the Middle East and Caucasus regions.

Patricia Walsh is the Executive Director for Administration at the Belfer Center for Science and International Affairs, Kennedy School of Government, Harvard University. She has been at Harvard for 17 years and has held several administrative positions. She worked in the Kennedy School Dean's Office ending as Special Assistant to the Dean; as Administrative Coordinator of the Strengthening Democratic Institutions Project; and as Executive Assistant to the Provost. She has a B.S. in Elementary Education.

Financial Report

The Belfer Center for Science and International Affairs had an operating surplus of \$62,789 in fiscal year 2001, compared to an operating surplus of \$537,066 in fiscal year 2000. The Center's restricted endowment and gift balances decreased to \$3.33 million in fiscal year 2001 compared to \$3.8 million in fiscal year 2000. This is directly attributable to the transfer of gifts received to establish the Carr Center for Human Rights Policy, formerly a program with the Belfer Center.

The market value of the Center's research endowment funds decreased to \$49.0 million from \$51.5 million. As of June 30th, the market value of all endowment funds associated with this Center was \$79.1 million.

Total income increased 22% from \$7.14 million to \$8.72 million. The Center realized increases of income in endowment (4 percent), publication (62 percent), miscellaneous (50 percent), sponsored (61 percent), residence fee (28 percent), overhead (21 percent) and faculty assistant (8 percent). The Center realized decreases of income in gifts (37 percent) and temporary investment (4 percent). Core loans, transfers, and adjustments are journal entry transfers processed to balance funds within the Center and can fluctuate greatly from year to year.

The Center's expenses increased 21 percent from \$7.55 million to \$9.16 million. Salaries, fellows, other personnel, extra compensation, fringe benefits and services represent 54 percent of the Center's total expenditures in fiscal 2001 (\$4.98 million) and in fiscal 2000 (\$4.07 million). All other categories of expenses increased in fiscal 2001 with the exception of office expenses, which decreased (1 percent) from \$494,791 to \$489,304, and KSG indirect, which decreased (8 percent) from \$436,785 to \$402,618; travel and meetings increased (51 percent) from \$488,397 to \$735,669, rent increased (33 percent) from \$520,239 to \$694,272, residence fee increased (18 percent) from \$400,307 to \$473,001, and overhead increased (30 percent) from \$955,332 to \$1.24 million. Core loans, transfers, and adjustments are journal entry transfers processed to balance funds within the Center and can fluctuate greatly from year to year.

The Belfer Center for Science and International Affairs consists of five programs for this fiscal reporting period: Core, the International Security Program (ISP), the Environment and Natural Resources Program (ENRP), the Science, Technology, and Public Policy Program (STPP), and the WPF Program on Intrastate Conflict, Conflict Prevention and Conflict Resolution (WP). The Strengthening Democratic Institutions (SDI) is a research project associated with BCSIA, but whose finances are administered separately. Although each program is required to support itself, the distribution of the Ford endowment, the Center's largest, supports both the Core and International Security Program. For this reason, the financial report reflects them as a combined program.

The Core/International Security program is the largest program within the Center, incurring 48 percent (\$4.4 million) of the Center's expenses in fiscal 2001. The \$4.4 million of expenses was funded from the following sources: 49 percent (\$2.14 million) from endowment funds, 11 percent (\$498,238) from gift funds, 11 percent (\$462,078) from unrestricted funds, and 29 percent (\$1.29 million) from sponsored research grants and contracts from the Carnegie

Corporation of New York, the Compton Foundation, the W. Alton Jones Foundation, the John D. and Catherine T. MacArthur Foundation, the Smith Richardson Foundation, and the Department of Justice.

The Environment and Natural Resources program incurred 20 percent (\$1.85 million) of the Center's expenses. The \$1.85 million of expenses was funded from the following sources: 3 percent (\$58,788) from endowment funds, 11 percent (\$212,362) from gift funds, 9 percent (\$174,295) from unrestricted funds, and 76 percent (\$1.41 million) from research grants and contracts from CMU (Carnegie Mellon University), the H. John Heinz III Center for Science, Economics and the Environment, the David and Lucile Packard Foundation, Department of Energy, the Environmental Protection Agency, the National Science Foundation, the Rand Corporation, and RFF (Resources for the Future).

The Science, Technology, and Public Policy program incurred 23 percent (\$2.11 million) of the Center's expenses. The \$2.11 million of expenses was funded from the following sources: 9 percent (\$188,280) from endowment funds, 9 percent (\$181,565) from gift funds, 10 percent (\$209,642) from unrestricted funds, and 73 percent (\$1.53 million) from research grants and contracts from CMU (Carnegie Mellon University), the Energy Foundation, the Heinz Family Fund, the Japan Foundation, the W. Alton Jones Foundation, the John D. and Catherine T. MacArthur Foundation, the David and Lucile Packard Foundation, the Alfred P. Sloan Foundation, the Winslow Foundation, the Department of Energy, the National Institute of Standards and Technology, and the National Science Foundation.

The WPF Program on Intrastate Conflict, Conflict Prevention and Conflict Resolution (WP) incurred 9 percent (\$803,608) of the Center's expenses. The WPF funding sources are 7 percent (\$54,443) from endowment funds, 51 percent (\$413,149) from unrestricted funds, and 42 percent (\$336,016) from a USAID (United States Agency for International Development) research grant.

Center Operating Results - All Programs

Current Year Income

Endowment	1,613,359
Gift	763,525
Temporary Investment	102,521
Publication	41,436
Miscellaneous	728,018
Sponsored	4,067,922
Residence Fee	512,627
Overhead Credit	441,821
Renovation Credit	95,370
Faculty Assistant Credit	212,952
Core Loans	143,167
Total	<u>8,722,718</u>
Adjustments for Multiyear Sponsored Research	498,021
Available Income	<u>-</u> 9,220,739

Expenses

Faculty Salaries	368,768
Administrative and Support Salaries	2,150,586
Fellows	949,751

Other Personnel	98,901
Extra Compensation	64,598
Fringe Benefits	739,691
Office Expenses	489,302
Services	610,020
Travel and Meetings	735,668
KSG Rent	694,272
KSG Indirect	402,618
Residence Fee	473,001
Overhead	1,237,607
Internal Core Loans	143,167
Total	<u>9,157,950</u>
Operating Surplus or (Deficit)	62,789

Endowment and Gift Balances

Adjusted Balance at Start of Year	3,796,604
Operating Surplus or (Deficit)	62,789
Transfers and Adjustments	<u>(530,272)</u>
Balance at End of Year	3,329,121