

The Local and the Global:
Workshop for the Rising Generation of Science,
Engineering, and Technology Policy
Professionals

Abstract Booklet



April 12-14, 2002

AAAS Building
1200 New York Avenue, NW
Washington, D.C.

*Center for International Science and Technology Policy at the Elliott School
of International Affairs, The George Washington University*

*Department of Science and Technology Studies at the Virginia Polytechnic
Institute and State University*

*Center for Science and Technology Policy in the School of Public Policy at
George Mason University*

American Association for the Advancement of Science

WELCOME & ACKNOWLEDGEMENTS

On behalf of the Center for International Science & Technology Policy at George Washington University, Center for Science & Technology Policy in the School of Public Policy at George Mason University, and the Department of Science and Technology Studies at Virginia Polytechnic Institute and State University, and the American Association for the Advancement of Science, we would like to welcome you to the 2002 Workshop for the Rising Generation of Science, Engineering, and Technology Policy Professionals.

The emerging field of science, engineering, and technology (SE&T) policy has become a recognizable profession in recent years. As the interaction between SE&T and government intensifies, the need for an SE&T policy workforce equipped with the tools and training necessary to negotiate this relationship is greater than ever. The purpose of this workshop is to better acquaint current and prospective SE&T policy professionals with the practice and opportunities of this emerging profession. This will be accomplished through a blend of plenary and breakout sessions, led by seasoned SE&T professionals, and sessions devoted to the presentation of scholarly papers on timely SE&T policy issues.

We would like to thank the following people and organizations for their generous contribution:

- American Association for the Advancement of Science (AAAS)
- The Center for International Science and Technology Policy at George Washington University
- Center for Science & Technology Policy in the School of Public Policy at the George Mason University
- Virginia Polytechnic Institute and State University Department of Science and Technology Studies
- Barbara Allen, Virginia Tech
- Robin Auger, George Mason University
- David Bruggeman, Virginia Tech
- Dave Cooper, AAAS
- Victoria Friedensen, NASA/National Academy of Engineering
- Scott Hauger, AAAS
- Amanda Hunt, AAAS
- Alex Klein, George Mason University
- Todd LaPorte, George Mason University
- Steve Lita, AAAS
- Luis Maes, George Washington University
- Jen Runyon, George Washington University
- Bob Rycroft, George Washington University
- Nicholas Vonortas, George Washington University

**THE LOCAL AND THE GLOBAL: A WORKSHOPS FOR THE
RISING GENERATION OF SCIENCE, ENGINEERING, AND
TECHNOLOGY POLICY PROFESSIONALS**

April 12-14, 2002

American Association for the Advancement of Science
1200 New York Avenue, NW, Washington, DC

Agenda

Friday, April 12

6:00 – 7:00 p.m. **Networking Reception**
Light refreshments provided

Saturday, April 13

8:30 – 9:00 a.m. **Sign in and Continental Breakfast**

9:00 – 9:05 **Welcome**
Barbara Allen, Virginia Polytechnic Institute
Steve Nelson, AAAS

9:05 – 10:00 **Keynote Speakers**

“Pathways to Policy: Two Gardeners in Conversation”

Daryl Chubin, Senior Vice President, Policy and Research, National Action Council for
Minorities in Engineering

Shirley Malcom, Head, Directorate for Education and Human Resources Programs,
American Association for the Advancement of Science

10:00 - 10:15 **Break**

10:15 - 11:45 **Plenary Session**

“The Breadth of Science and Technology Policy Careers”

Moderator: Sherri Stephan, Senate Governmental Affairs Committee

Rich E. Bissell, The National Academies
Kerri-Ann Jones, Maine Statewide EPSCoR Director
Michelle McMurry, Office of Senator Joseph Lieberman
Brant Sponberg, Office of Management and Budget
Michael Twery, National Heart, Lung, and Blood Institute, NIH

11:45 a.m.- 1:00 p.m. **Lunch**

1:00 - 2:00 **Plenary Session**

“Global Science and Technology Policy”

John Forrer, Center for the Study of Globalization, George Washington University

“How do Global Environmental Problems get to be "Global"?”

Steve Yearley, York University

2:00 - 2:15 **Break**

2:15 - 3:45 **Concurrent Sessions**

“What Scientists and Policymakers Need to Learn from Each Other”

Moderator: Susan E. Cozzens, Georgia Institute of Technology
Jean Fruci, House Committee on Science
Tobin L. Smith, University of Michigan

Graduate Student Paper Session A

Balancing Human Activities and Environmental Impacts, Abelson Room, Moderator:
Steve Yearley

A.1 D. Stickers, Octane and the Environment: Gasoline Regulation and Technologies Employed to Provide Octane from 1970 – 2000

A.2 K. Roth, Integrated Scenario Assessment of Air Quality in Mexico City: The Residential Sector

A.3 S. Bin, Consumer Lifestyles, Energy Use and Carbon Dioxide Emissions

Internet Governance: Current Status and Future Challenges, Haskins Room, Moderator: Todd LaPorte

A.4 C. Pommerening, Westphalia meets Tuvalu – The Relation of State and Non-State Actors in Internet Governance

A.5 L.E. DeNardis, Internet Governance and Global Policy Dilemmas

A.6 M. O’Reardon, Internet Jurisdiction: The International Perspective in 2001

Influences on Science and Technology Policy, Revelle Room, Moderator: Daryl Chubin

A.7 S. Miley, The Presidential Science Advisor: Is Science Advice Institutionalized in the White House?

A.8 R. Hira, The Role of Engineering Professional Societies in the Science & Technology Policy Process

A.9 E. Lane, Lay Participation and IRBs: Considerations for Research Policy

A.10 K. Van Houtan, Truth and Democracy; the role of Judeo-Christian paradigms in biodiversity science

3:45 - 4:00 **Break**

4:00 - 5:30 **Concurrent Sessions**

“Establishing a Journal and Society for S&T Policy Professionals”

Moderator: Elmer Yglesias, Georgia Institute of Technology

Graduate Student Paper Session B

Impacts of the Information Economy, Abelson Room, Moderator: Todd LaPorte

B.1 C. Michalopoulos, C. Hayter, S. Lita, Harnessing the Awards of Globalization: The Role of Information and Communication Technology

B.2 S. Gorman, Spatial Small Worlds: Localization and Global Connections

Sustainable Development - Not Just for Developing Countries, Haskins Room
Moderator: Bob Rycroft

B.3 D. Lieberman, J. Preston, Trends in Technology Transfer for Industrial Ecology and Sustainable Development as Indicators of Globalization

B.4 I. Bortagaray, M. Lima, Science, Technology and Sustainability in Developing Countries

B.5 R. Forcano, Renewable Energy for Rural Electrification: Promoting a Sustainable Development

Diverse Influences of and on Globalization, Revelle Room, Moderator: Nick Vonortas

B.6 K. Fontaine, A. Park, M. Teismann, Intellectual Property and Investment: What are the Linkages?

B.7 A. Andreoni, The Security Implications of Technology Integration

B.8 D. Bruggeman, Technocracy and Globalization - an Analysis

B.9 P. Feng, Standardization and Globalization: Linking the Local to the Global

5:30 Adjourn for the Day

Sunday, April 14

8:00-8:30 a.m. Sign-in and Continental Breakfast

8:30 - 9:30 Plenary Session

“Public R&D in the Well-Governed Technological Society”
David Guston, Rutgers University

“Science and Technology in 21st Century Foreign Policy”
Norman Neureiter, Science and Technology Adviser to the Secretary of State

9:30-11:00 Concurrent Sessions

Graduate Student Paper Session C

Strategies for a Changing World, Abelson Room, Moderator: Bob Rycroft

C.1 N. Li, Catching-up in the Process of Globalization: Trade Orientation Strategies and Their Determinants in Developing Countries

C.2 A. Fricke, SETI and Science Policy: Privatizing "Big Science"

C.3 S. Mohaptra, The Global Vs the Local: Challenges to the Indian Software Industry

Framing Research: Critiques of Current Models and Alternatives, Auditorium,
Moderator: David Guston

C.4 S Mousavi, Bounded Rationality in The Light of Reequilibration

C.5 E. Yglesias, Porter vs. Porter: Modeling the Technological Competitiveness of Nations

Globalization and its Challenges to Developing Countries, Haskins Room, Moderator:
Barbara Allen

C.6 J. Schulman, Global Changes in Information Distribution: Is the News Good or Bad for Science in the Third World?

C.7 C. Maneja, Geometry and Geography: Localized Learning in Southeast Asian Growth Triangles as a Regional Strategy of Development

C.8 B. Dewhurst, B. Ramsey, J. Runyon, FDI, Infrastructure, Globalization

Tools and Practices of Cooperation, Revelle Room, Moderator: Nick Vonortas

C.9 E. Webster, Technology Transfer: Cooperative Research and Development Agreements

C.10 J. Krezel, How to Cooperate When You Really Don't Care– The Agreements and Problems of the International Space Station

C.11 R. Auger, The Influence of Political Ideology On Public-Private Technology Collaboration in the United States

11:00-12:00 **Wrap-up**

12:00 Noon **Meeting Adjournment**

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PROFESSIONALS**

ABSTRACTS

BALANCING HUMAN ACTIVITIES AND ENVIRONMENTAL IMPACTS

A.1 David E. Stickers

Center for the Study and Improvement of Regulation
Department of Engineering and Public Policy
Carnegie Mellon University
Pittsburgh, PA

*Octane and the Environment: Gasoline Regulation and Technologies Employed to
Provide Octane from 1970 – 2000*

One of the most important technical issues of the automotive fuel regulatory regime that has evolved since 1973 is the need to provide sufficient octane while at the same time meeting increasingly stringent fuel content requirements designed to protect public health. There are several ways for refiners to provide octane and all of them have environmental consequences. This paper traces the technological and environmental tradeoffs that have occurred from initial lead reduction rules in 1973 through the first phase of the reformulated gasoline program ending in 2000. This analysis suggests that the process of gasoline regulation and the technological response to maintain octane quality is non-linear in nature. Each step in the process can be described as an advance in environmental improvement when viewed in terms of reduced tailpipe emissions. Each improvement, however, was accompanied by a unique and generally unanticipated consequence that often led to a partial step back in environmental quality. To mitigate these partial steps back, more regulation was required, which in turn led to further unanticipated consequences. This pattern points to potential efficiencies to be gained from a more systematic approach to the design of future regulations and further lessons that might be learned from similar analysis of other regulatory systems.

A.2 Kellyn E. Roth

Massachusetts Institute of Technology
Boston, MA

Integrated Scenario Assessment of Air Quality in Mexico City: The Residential Sector

The magnitude and complexity of the atmospheric pollution, and resulting health problems, in the Mexico City Metropolitan Area (MCMA) requires a multidisciplinary approach with solid scientific and technical foundation and an integrated strategy for decision-making. MIT's Integrated Program on Urban, Regional and Global Air Pollution: Mexico City Case Study (Mexico City Project) was established to support the

Metropolitan Environmental Commission's (CAM) effort to develop an effective air quality program for the MCMA. The program, with cooperation from Mexican institutions and other universities and research groups, analyzes inter-sectoral strategies for the reduction and management of air pollution in the MCMA. The project seeks to build the capacity of Mexico City and other developing nation megacities to address such problems by considering the effects of pollution on human health, the economy, ecosystems as well as international problems such as global warming.

Using a bottom-up modeling approach, I am currently evaluating the residential sector in the MCMA: sources of pollutant emissions; viable emissions reduction strategies; technological, economic, and political feasibility of reduction alternatives; and coordination of these alternatives with other sector approaches. Air reduction strategies must also be robust across varied future possibilities characterized by local, regional and global factors. The residential sector provides the opportunity to evaluate the implications of household energy and resource consumption and other decisions that affect their indoor environment and personal exposure. A survey of households in Mexico City is being planned to identify key drivers in these decisions and educate households on their implications.

A.3 Shui Bin

Department of Engineering and Public Policy
Carnegie Mellon University
Pittsburgh, PA

Consumer Lifestyles, Energy Use and Carbon Dioxide Emissions

Historically, a sectoral approach (based on the industrial, transportation, commercial, and residential sectors) has shaped the way we frame and analyze issues of energy conservation and CO₂ mitigation. This sectoral categorization, however, is limited in its capacity to reveal the total impacts of consumer activities on energy use and the related environmental impacts. In this paper, we propose an alternative paradigm, called the Consumer Lifestyle Approach (CLA), to explore the relationship between consumer activities and environmental impacts. Estimates based on our methodology reveal that more than 80% of the energy used and the CO₂ emitted in the US are a consequence of consumer demands and the economic activities to support these demands. Direct influences due to consumer activities (home energy use and personal travel) are only 4% of the U.S. GDP, but it accounts for 28% and 41% of U.S. energy use and CO₂ emissions, respectively. Indirect influences (such as housing operations, transportation operations, food, and apparel) represent a larger share of the U.S. economy, energy and CO₂ emissions than direct energy consumption (Indirect influences are 1.5 times higher for energy use and 2 times higher for CO₂ emissions than direct influences). These findings not only portray the national profiles of energy use and CO₂ emissions, but also remove the "them versus us" (industrial polluters versus consumers) stereotypical references of responsibility.

INTERNET GOVERNANCE: CURRENT STATUS AND FUTURE CHANGES

A.4 Christine Pommerening
School of Public Policy
George Mason University
Fairfax, VA

Westphalia meets Tuvalu – The Relation of State and Non-State Actors in Internet Governance

Globalization, among other things, means that governance is increasingly shifted to the international level. Traditional treaty organizations, institutions of civil society, and transnational corporations are the actors of global public policy. Some policy arenas, like the environment and the Internet are considered to transcend national sovereignty altogether. As a consequence, the role of nation states is diminishing. The three hundred year-old, so-called Westphalian world order seems to come to an end, where nation states had both the sovereignty to decide domestic policies concerning their citizens, and the ability to act independently in foreign affairs. Developments in science and technology, in particular, seem to have contributed to this fragmentation of power.

This paper will use the case of Internet governance to examine the extent of the change, and describe some features of a potential new order. Four cases will be presented: France vs. Yahoo, Robert Elz vs. auDA, the US government and ICANN, and, finally, Tuvalu and the .tv domain.

These cases will show how the science and technology logic of the Internet is determining policy outcomes, and how its applications enable an unprecedented degree of independence for some, while limiting sovereignty for other entities. They will provide insight into the complex and changing relations between state and non-state actors, citizens and governments, and individuals and society at large.

A.5 L. E. DeNardis

Science and Technology Studies
Virginia Polytechnic Institute and State University
Northern Virginia Center
Falls Church, VA

Internet Governance and Global Policy Dilemmas

Most Internet governance discussions address national policies while the Internet itself obviously transcends political demarcation. The Internet's expansiveness and socioeconomic importance has created challenging global policy issues. A coordinated attack on key infrastructural components or a major security breach could now have significant economic and social repercussions. Should governments therefore bear responsibility for critical infrastructure protection and network security? Can governing bodies balance protecting citizens and economic assets versus violating privacy? Some constituencies still assail Internet governance or coordination as an affront to its originally open and user-driven image, even though *de facto* societal norms and technological standards were long ago reified into the Internet. Even mundane

responsibilities like IP number system and DNS administration or technical standards setting have been controversial, including questions about their global inclusiveness. Most national policy concerns, such as the digital divide, are dramatically more pronounced globally. Attempts to ameliorate global Internet access disparities are emerging among some prominent agencies but face enormous political, economic, and even religious or ideological challenges. Globally, the digital divide not only captures access disparity but also nationally imposed content restrictions for those already connected. Will the Internet simply become a reflection of the world it connects, with international zoning, haves and have nots, widely varying freedoms and restrictions, and electronic commerce regulated like other trade? This paper offers a framework for understanding the complex and widely variable policy issues addressing Internet governance with an emphasis on global contexts.

A.6 Meighan O'Reardon

Science, Technology and Public Policy Program
Elliott School of International Affairs
The George Washington University
Washington, D.C.

Internet Jurisdiction: The International Perspective in 2001

The Internet is not defined by the geographic boundaries that govern nations and laws of the non-virtual world. Without a clear jurisdictional framework for the Internet, scholars, businessmen, and laypersons have been left to decipher in a piecemeal fashion what set of laws and norms, if any, shall govern this forum. The United Nations recognizes 189 sovereign countries throughout the world, each with its own system of governance and legal framework. This leaves a vexing international question of who should exercise power over Internet activity and what standards shall be upheld.

With an expected global explosion of online activity, questions of international jurisdiction are certain to arise with increasing frequency in the coming years. It leaves one to question what online jurisdictional principles are currently being followed and what these trends indicate for the next decade.

Certain behavior on the Internet has exacerbated questions of international jurisdiction. Differing standards of conduct and international variations in codified laws have created a situation in need of attention. Online incidents involving hate speech, privacy, and gambling best exemplify the variations in national laws and conflicts that have arisen. ECommerce has led to debates over the taxation of goods purchased online, further amplifying jurisdictional issues.

INFLUENCES ON THE S&T POLICYMAKING PROCESS

A.7 Steven Miley

School of Public Policy
George Mason University
Fairfax, VA

The Presidential Science Advisor: Is Science Advice Institutionalized in the White House?

Research on the Presidency reveals a growing and complex White House staff that includes experts and support staff who advise the president on issues such as national security, economics, foreign policy and science and technology policy. This research investigates the role of the presidential science advisor and his corresponding organizational staff structure from President Eisenhower to the present day. The hypothesis of this research is that the presidential science advisor's role is essentially president-centered, that is, the science advisor's role and functions depend more on the needs and preferences of the president than on the science advisory institutional structure, therefore, the White House science advisory system is not institutionalized.

This research adds insight to previous work on presidential advisory systems by analyzing changes in the science advisory system in the context of other scholarly work on the presidency and presidential advising. Further, this research is important because it examines whether, and the degree to which, the presidential science advisory structure is institutionalized. If one agrees with Nelson Polsby's premise that institutionalized structures and processes are necessary precedents to a viable political system,¹ the degree of institutionalization found within particular parts of the political system, such as the presidential science advisory structure, is worthy of study.

The research concludes that the White House science advisory structure is not institutionalized. The illumination of the presidential science advisory structure during the ten presidencies, beginning with Eisenhower's, enlightens current and future presidential science policy participants.

A.8 Ron Hira

School of Public Policy
George Mason University
Fairfax, VA

The Role of Engineering Professional Societies in the Science & Technology Policy Process

This paper describes practical aspects of how Engineering Professional Societies (EPS) set their policy agendas, formulate positions, and try and influence government policy. Many EPS's are international organizations, and at times domestic policy activities conflict with views of non-domestic members. The sources of these conflicts and their

resolution will be described. The relationship between full time EPS Government Relations staff and the volunteer members is also examined. Major EPS's are surveyed to compare and contrast their structure and the mechanisms that they use to influence the policy process, e.g., direct monetary contributions, providing expert opinion, letters of support for legislation, etc.

A.9 Eliesh O'Neil Lane

School of Public Policy
Georgia Institute of Technology
Atlanta, GA

Lay Participation and IRBs: Considerations for Research Policy

Current regulations for Institutional Review Boards (IRBs) provide only general guidance on board member composition. Most organizations include one “nonexpert” on their IRBs. In December 2000 the National Bioethics Advisory Commission released a report that examined the system for protecting human research participants and identified potential improvements, including recommendations for the creation of criteria and standards for selecting IRB members. While some organizations already meet or exceed such recommendations, many others find them controversial. The number of IRB members with little to no technical expertise creates concern for many scientists that an already slow system will become even slower. Some scientists worry that the need for technical knowledge to review diverse research proposals is problematic for nonexperts, who presumably would lack formal scientific training. Yet, a diverse board can also lead to broader discussion of proposed research such that potential risks are more likely discovered before research is undertaken.

IRBs are in a powerful position to determine which research moves forth and which is denied approval. Effectively, the board serves as gatekeeper for an institution — both creating and setting research policy. These issues raise important questions for governance of science and technology. Who should decide the composition of an IRB? What constitutes a “nonexpert”? How should nonexperts be selected? If more lay persons participate on IRBs, is the public actually more empowered to actively make research policy? This paper attempts to begin to answer these questions by studying IRBs in a sample of Atlanta-area university, medical and other organizations.

A.10 Kyle Schuyler Van Houtan

Center for Environmental Research and Conservation
Department of Ecology, Evolution, Environmental Biology
Columbia University
New York, NY

Truth and Democracy; the role of Judeo-Christian paradigms in biodiversity science

Scientific research and policy are shaped by a number of influences. These include government priorities, funding structures, and technological capabilities--to name a few.

But, perhaps one of the greatest influences here is societal perception and values. Public opinion plays a significant role in the democratic politics of science and technology policy. As Jews and Christians represent over 60% of America, what then, is the role of religious beliefs in shaping science research and policy? Where most analyses in this context ask how knowledge and technology drive society, here I offer the reverse. How do beliefs filter scientific research and drive policy? This paper examines the interplay between religion, science, and policy, using the arena of biodiversity as a case study. As Judeo-Christian worldviews shape much of the U.S.-dominated western culture, how do these perspectives perceive biodiversity science and policy? Jews and Christians have diverse worldviews just like the rest of society. However, linked by a common scripture, their religions provide a systematic framework of theology to help us understand this diversity. This may highlight and explain the link between scientific initiatives and successful, long-term, science policy. In the case study of biodiversity conservation, there are four competing responses to biodiversity research and initiatives. These worldviews are: absent, skeptic, non-priority, and embrace. Such responses typify broader societal paradigms that shape science and science policy in our democratic government.

IMPACTS OF THE INFORMATION ECONOMY

B.1 Constantine Michalopoulos, Chris Hayter and Steve Lita

Science, Technology and Public Policy program
Elliot School of International Affairs
The George Washington University
Washington, D.C.

Harnessing the Rewards of Globalization: The Role of Information and Communication Technology

The past three decades have seen numerous innovations in the field of information and communication technology (ICT) which have not only led to myriad new technologies but have fundamentally altered the rules governing national economies and given rise to the “New Economy.” These technologies, coupled with the rise of globalization, have produced a hyper-competitive market environment and compelled firms to change their business and management practices. The economic impacts of globalization can be directly observed by examining trends in a number of global transactions such as: international trade; capital movements (both portfolio and foreign direct investment); local and regional clustering; patenting; and corporate collaborations such as joint ventures, mergers and acquisitions, and strategic alliances. Because the ICT sector can be broken out as a component in most of these indicators it can be used to analyze the extent and impact of globalization. Our paper will examine the data for strategic alliances, international trade, clusters, and entrepreneurship in the ICT sectors, and show that those nations that participate most actively are also the countries that are reaping the economic rewards of globalization.

B.2 Sean P. Gorman

School of Public Policy
George Mason University
Fairfax, VA

Spatial Small Worlds: Localization and Global Connections

Networks are structures that pervade many natural and man-made phenomena. Recent findings have characterized many networks as not random chaotic structures but as efficient complex formations. Current research has named these complex networks small world or scale free, but has examined them as purely non-spatial phenomenon. Location, distance, and geography, though, are all vital aspects of a wide variety of networks. This paper will examine the United States' portion of the Internet's infrastructure for evidence of small world networks and what role distance and geography play in their formation. From these findings implications will be drawn on the economic, political, and technological impacts of network formation and evolution in an information economy.

SUSTAINABLE DEVELOPMENT: NOT JUST FOR DEVELOPING COUNTRIES

B.3 Derek Lieberman and Jason Preston

Science, Technology and Public Policy Program
Elliott School of International Affairs
The George Washington University
Washington, D.C.

Trends in Technology Transfer for Industrial Ecology and Sustainable Development as Indicators of Globalization

The 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro and Agenda 21 called on the international community to provide a supportive international climate for achieving environmental and development goals under the paradigm of "sustainable development." While this placed environmental crises at the top of the international agenda in the early 1990s, globalization, in terms of economic development, has since taken reign and has undermined sustainable development goals. As a result, continued environmental degradation, along with lack of progress in technology policy and transfer for sustainable development and industrial ecology, has come to represent an indicator of globalization in the negative sense.

B.4 Isabel Bortagaray, Maria Barbosa Lima

School of Public Policy
Georgia Institute of Technology
Atlanta, GA
Escola de Administração
Universidade Federal do Rio Grande do Sul
Brazil

Technological innovation is a substantial component in the search for economic growth. Moreover, economic growth is in turn a necessary condition for development. However, growth does not necessarily mean development, nor the transition from growth to development is a spontaneous process. This potential tension between growth and development has been largely discussed, and it only serves as a departure point for this work. Nevertheless, science and technology policy could play an important role in bridging this gap, even though there is not a unique path to do so. This paper explores these possible different paths while looking at some particular cases, attempting to tease out the advantages and disadvantages of these distinct modes of connections between science and technology policy and development. Particularly, this paper analyzes current S&T policies in Argentina, Brazil, Uruguay, and Costa Rica.

B.5 Ricardo Forcano

Technology and Policy Program
Massachusetts Institute of Technology
Boston, MA

Renewable Energy for Rural Electrification: Promoting a Sustainable Development

The economic development of rural areas is a national priority in many developing countries. One of the barriers for the development of numerous economic activities among rural populations is the lack of electricity supply. However, the extension of the electricity grid to remote, rural areas that bare a low demand for electricity can be very costly and economically non-feasible. Decentralized small-scale renewable energy systems can make it possible to provide electricity to rural areas at a reasonable price.

In a global context, the use of renewable energy for rural electrification may help achieve a less carbon-intensive growth in developing nations and, therefore, contribute to create a sustainable development. Although industrialized countries are currently responsible for a large share of world energy consumption, the high rate of energy consumption growth observed in many developing countries predicts a substantial increase of their contribution in the near future. The promotion of renewable energy for rural electrification could help renewable systems penetrate high-growth industrial and urban sectors in those developing regions.

The development and implementation of renewable energy systems for rural electrification is a complex process that involves scientific, technological, economical, and institutional issues. The steps in this process are: (i) characterization of electrical demands; (ii) assessment of available renewable energy resources; (iii) life-cycle cost analysis of technically feasible options; (iv) system selection and design; and (v) definition of a financial and institutional approach.

In conclusion, the use of renewable energy for rural electrification may contribute to advance rural economic development while promoting a sustainable development.

DIVERSE INFLUENCES OF AND ON GLOBALIZATION

B.6 Kathy Fontaine, Ahseon Park, and Matt Teismann

Science, Technology and Public Policy Program
Elliot School of International Affairs
The George Washington University
Washington, D.C.

Intellectual Property and Investment: What are the linkages?

This presentation explores whether national intellectual property (IP) regimes and compliance with international IP conventions and treaties facilitate increased levels of foreign direct investment (FDI) and research and development (R&D) investment in a country. Our analysis begins by dividing nations into three tiers, with each tier based on economic development and the sophistication of the national innovation systems. The top tier is occupied by the nations of the Triad: the United States, Europe and Japan. These nations are the most economically advanced and possess the most sophisticated national innovation systems. Next, we call the countries of the second level “second tier outliers.” This class includes China and other nations with advanced economies and relatively complex innovation systems. Lastly, we place developing nations in the bottom tier. Our concern is with the FDI and R&D flows among the nations of the Triad and between the nations of the second tier the Triad. We ask whether IP regimes influence trade and investment flows among countries of the same tier and between nations of different tiers. More specifically, we examine whether the veracity of a national IP regime and a country’s compliance with international IP agreements influence the type of investment a nation attracts. We conclude national IP regimes and compliance with international IP conventions are significant variables that must be examined to fully explain FDI and R&D investment patterns among nations and between the tiers.

B.7 Alessandro Andreoni

Security Policy Studies
The Elliott School of International Affairs
The George Washington University
Washington, D.C.

The Security Implications of Technology Integration

Over the last decade the defense industry underwent significant transformations coping with decreasing defense budgets, increasing international competition and skyrocketing costs in technology development. The impact of these factors reduced the overall number of firms in the market, gave life to integrated structures (producing and developing both military and commercial technology) and extensively turned technological manufacturing into a dual-use activity.

The current scenario is also re-enforcing this ambivalence. Once more there seems to be a shift in the nature of the supply according to the nature of the demand. As commercial

procurement seems bound to decrease (and defense budgets to increase), the chance to hedge against this trend pursuing military-oriented production is a reassuring perspective for the sector.

The Recurring Trends:

- Integrated technology production and development
- High inter-operability of the items produced
- Multi- market access
- International outsourcing
- Transnational technological cooperation and subcontracting
- Decreased control on commerce trajectories

The Security Issues:

- Liberalization (efficiency-seeking) of the defense market equals broader technology diffusion
- The perils of dual-use technology commercialization.

The Dilemmas:

- Will efficiency and national security clash?
- Is there an endemic incongruence, fundamental to address but hard to resolve, between optimization (market driven) and national security?
- What are the conditions that make strategic international technological alliances and strategic international political alliances converge?

Presentation Objectives:

- Singling out the issues
- Revealing the dilemmas
- Furnishing recommendations
- Outlining the options for both policymakers and the corporate sector

B.8 David Bruggeman

Science and Technology Studies
Virginia Polytechnic Institute and State University
Northern Virginia Center
Falls Church, VA

Technocracy and Globalization - an Analysis

In this era of increasing technological and global activity, the existence of technocracy deserves examination. Both a utopian and dystopian political notion, technocracy, and its dependence on expert knowledge to exert control, is still relevant today, if increasingly impractical. This paper examines the theoretical roots of technocracy, its history in America as political theory and practice, and examines its mark on global organizations such as the World Bank. It also addresses the challenges of governance in the 21st century, and argues that technocracy is not an appropriate strategy for managing or governing an increasingly technical and global world.

B.9 Patrick Feng

Department of Science and Technology Studies
Rensselaer Polytechnic Institute
Troy, NY

Standardization and Globalization: Linking the Local to the Global

Technical standards—those protocols, rules, and codes that specify how a given group of technologies operate and interoperate—play a key role in today’s technological society. Standards serve to ensure product quality, create uniformity, assure compatibility between technologies, produce “objectivity” in measurement, normalize operating procedures, and more. They can be found in almost every facet of modern life. This paper explores the ways in which technical standards -- and the work of international standards organizations -- are implicated in broader processes of globalization.

Drawing on interviews and participant observation with two standards organizations in the field of computing, this paper argues that -- far from being a “purely technical” activity -- standards-setting is a complex process with potentially deep social and political implications. For example, the adoption of a single Internet standard could conceivably affect millions of people, yet such decisions are delegated to small groups of technical experts with few, if any, systematic mechanisms of public accountability. Are the decisions of these groups reasonable and just? What is the “public interest” in when it comes to technical standards, and are such matters best left to technical experts? Given their importance, are there ways to make technical standards-setting more “democratic”? These are some of the key questions this paper will address.

STRATEGIES FOR A CHANGING WORLD

C.1 Ning Li

School of Public Policy
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Catching-up in the Process of Globalization: Trade Orientation Strategies and Their Determinants in Developing Countries

This paper investigates trade orientation strategies and their determinants in developing countries theoretically as well as empirically. A sample with 42 developing countries and 1996 UN international trade data are used for empirical studies. Although import substitution and export promotion strategies have often been viewed as opposites or completely separate theoretical categories, in most cases a nations industrialization strategy is a mixture of both. Trade orientation is like a spectrum rather than a simple dichotomy. The author argues that trade orientation strategies in developing countries vary among different sectors as well as among different stages of development. While the empirical study strongly supports the notion that trade orientation may vary in different

stages of development, sectoral differences in trade orientation appear not very significant. As to the determinants of trade orientation, this paper discusses possible factors in general and examines how the size of domestic market affects trade orientation from such dimensions as economies of scale, user-supplier relationships, and technological development. Through the regression model built to test whether these determinants (political factors are excluded) have significant impacts on trade orientation in developing countries, it is found that all variables considered are significantly associated with export orientation industrialization index. The empirical study also indicates that among the various determinants, level of development (LOD) is a far more important contributor than others.

C.2 Arthur C. Fricke

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SETI and Science Policy: Privatizing "Big Science"

This paper explores how one area of 'big science' has been transformed in response to economic and political changes. SETI is a scientific research program in which radioastronomers use large radio telescopes to "listen" for alien signals. Until the early 1990s, SETI research was funded primarily by NASA. In 1993, however, all direct government support for SETI was terminated due to congressional cost-cutting pressure.

Rather than lobby for a continuance of funding, SETI researchers built a private network of funding from direct public enrollment, foundation grants, and donations from wealthy individuals. Today, SETI manages a \$15 million dollar yearly budget – \$5 million more than when it was subsidized by NASA. SETI's success with private funding is indicative of larger trends in scientific research. Similar changes in "big science" economics have occurred in physics, biotechnology, and other fields.

Of all these areas of "big science" privatization, SETI is particularly interesting for two reasons. First, it is frequently associated with UFO investigation, which makes fundraising more difficult. Second, the fact that SETI researchers have generated no evidence of extra-terrestrial intelligence in nearly fifty years of searching places SETI in a difficult position; it competes for donations against other private organizations whose benefits are quantifiable, immediate, and socially acceptable, such as hunger relief. Their enormous success in fundraising despite an unusual cause and no evidence of effectiveness deserves study. This paper will therefore explore how SETI works to build new forms of scientific legitimacy and material support.

C.3 Sushanta Mohapatra

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The Global Vs the Local: Challenges to the Indian Software Industry

Observers often acclaim India to be a software solution provider that has transformed a tiny niche in the information technology business into an engine for economic growth. This paper intends to take a hard look at the commonly accepted growth paradigm and, while examining the strengths and weaknesses of the Indian software industry, presents a policy dilemma: Should India continue to emphasize on global software service delivery or should it shift its focus to development of local software products that may gradually mature to cater to a wider global audience?

The outsourcing model of software development that has fuelled growth for the Indian software industry presents an interesting dichotomy. On the one hand, it requires firms to provide technically competent programmers. On the other hand, it limits the scope of participation of these programmers in the business domain itself. This client-driven model of service delivery stifles the development of domain knowledge. Contrary to the global service delivery model, the product development model requires firms to engage in fundamental research, both in business domains and technologies. A long-term commitment to R&D generates the firm level human capital required to sustain growth in the face of competition from peer supplier countries.

Each model has a distinct set of strengths and weaknesses. The solution to this policy debate may remain in a strategic mix of products and services - a blend of the local and the global – that would create a sustainable growth trajectory

FRAMING RESEARCH: CRITIQUES OF CURRENT MODELS AND ALTERNATIVES

C.4 Shabnam Mousavi

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Falls Church, VA

Bounded Rationality in The Light of Reequilibration

Decision-making, problem solving, scientific and non-scientific judgment, and inquiry are all different names for the same thing: resolving the question at hand. My subject of investigation is the general form of the interaction between people and their environment. This is not the same as suggesting that all people apply some general rules in solving all different types of problems. Rather, it is an effort to describe decision-making in abstract terms and to evaluate the capacity of alternative frameworks to characterize it. I assert that the same rules, which characterize the underlying philosophy of economists, who model human activity as utility maximization lead to optimization as the formalizing tool for utility-maximizing behavior. However, the choice of a technical tool should be considered a secondary consequence of the beliefs that rule the mind of the modeler. The primary matter of interest, for me, is the mindset of the thinkers themselves. I claim that

“optimization” is a befitting framework for capturing the ideas of a thinker who assumes the existence of a real world of truth, independent of and prior to the procedure of inquiry. I want to reinvestigate the procedure of inquiry, starting from an alternative mindset. This mindset *does not* postulate a unique reality that can be reached by following a truthful path. Alternatively, the mind of the seeker is part of the seeking procedure, or inquiry. Inquiry starts when a state of equilibrium is disrupted and the inquirer seeks to restore equilibrium. “Reality” is what that is realized by the inquirer at each level of inquiry. This relative reality could remain true or be rejected in later steps of the inquiry. I expect that this alternative will provide useful operational explanations when applied to human behavior in context. Applying this idea to an economic framework is the subject of this paper.

C.5 Elmer Yglesias

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Porter vs. Porter: Modeling the Technological Competitiveness of Nations

The world is a complex place; we build models to understand it. Models attempt to provide simplified frameworks that are then tested by a variety of methods. The field of technological competitiveness of nations is no different. Two models are being proposed by: (1) Michael E. Porter and Scott Stern at the Council on Competitiveness, and (2) Alan L. Porter and J. David Roessner at the Georgia Institute of Technology. Each group has independently theorized a conceptual model, developed indicators, and collected statistical data accordingly.

A comparison between these two conceptual models offers a rare opportunity to study technological competitiveness by evaluating the similarities and differences of indicator selection and implementation. The paper and presentation will develop the comparison and address the following questions: What are the most appropriate indicators to measure technologically based competitiveness? What other components might enhance the indicator formulations? The author concludes with an endorsement of one of the models based on their methodological design and statistical rigor.

GLOBALIZATION AND ITS CHALLENGES TO DEVELOPING COUNTRIES

C.6 Jacque-Lynne Schulman

Science and Technology Studies Program
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Global Changes in Information Distribution: Is the News Good or Bad for Science in the Third World?

Over the last 30 years, the major indexing services in biomedicine have become increasingly monolingual. At the same time, there is competition among journals which seek to be included in the major indexing services. Less than half of those journals considered for inclusion are added and the acceptance rate is lower for non-English and non-western journals. Data is presented showing the publication patterns for biomedical research originating in selected Third World countries.

An analysis is offered on changes in publication patterns in medical research over a 30 year period from 1970 to 2000. The data include a comparison of publication rates in local or regional journals versus those published in the US and western Europe for ten nations in the Third World. From Africa, these are Nigeria, Kenya, Senegal, Tunisia, and Egypt. From Asia, these are Bangladesh, India, Pakistan, Sri Lanka, and Thailand. For scientists in these regions, there may be a conflict between submission of research to national journals and regional journals in support of locally-produced research versus publication in journals with international circulation. The later may make the information more widely available but does not support greater intellectual independence at the local level.

C.7 Claire Maneja

Communication, Culture, and Technology Program

Georgetown University

Washington, D.C.

Geometry and Geography: Localized Learning in Southeast Asian Growth Triangles as a Regional Strategy of Development

Amidst the ramifications of globalization, how can Southeast Asia -- a region marked by economic disparities and by varying degrees of economic cooperation -- form a coalition that will address the uneven levels of development? This paper argues that a commitment to the e-ASEAN initiative will institutionalize regional cooperation, by means of localized learning in growth triangles. Growth triangles in Southeast Asia tie up the most vital factors in regional economic cooperation: geographic proximity, an emphasis on local strengths and knowledges, and fostering intra-regional collaboration through exchanges of learning and resources. Growth triangles aim to enhance economic complementarity between member countries, the lack of which is dogging regional cooperation.

The e-ASEAN initiative is the region's collective response to the global networked economy. It aims to integrate existing political, economic, and cultural cooperative ventures in an electronic platform, using information and communication technologies.

I will examine the e-ASEAN collective endeavor and how less advantaged member states can benefit from exchanges of knowledge within the region. By focusing on the possibilities for economic cooperation through learning, I will first present the following as my theoretical backdrop: 1) the importance of regions; 2) remedies to problems of

collective action; and 3) how dynamic learning effects foster cooperation. Next, I will examine the history of ASEAN and evaluate its record of economic cooperation. Afterwards, I will discuss the rationale for the e-ASEAN and why member nations should support and implement it. Finally, I will suggest how learning-based coalitions can be implemented within growth triangles.

C.8 Brian Dewhurst, Becky Ramsey, and Jen Runyon

Science, Technology and Public Policy Program
Elliot School of International Affairs
The George Washington University
Washington, D.C.

FDI, Infrastructure, Globalization

Globalization has numerous definitions, but is mainly a phenomena of industrialized countries, specifically the triad of Europe, Japan and the United States. How does this affect the rest of the world? This paper argues that in order for a developing country to participate in the world economy it needs to focus its efforts on building its infrastructure instead of courting unsustainable trade and investment from the developed countries. The amount of endogenous investment in educational, physical and institutional infrastructure and the relative stability of the government accurately measure the ability of developing countries to participate in the world economy.

TOOLS AND PRACTICES OF COOPERATION

C.9 Edith Webster

Science, Technology and Public Policy Program
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Technology Transfer: Cooperative Research and Development Agreements

In 1986, Congress passed the Technology Transfer Act empowering federal laboratories to cooperate in R&D with private firms and from this legislation came Cooperative Research and Development Agreements, CRADAs. This legislation was designed to allow companies' greater access to federal laboratories and to expand the role of the mission agencies.

In 1995 Congress drastically cut funding for the Technology Transfer Act and the federal agencies likewise cut funds. The use of research funds instead of dedicated funds ensured that a project would directly benefit the federal mission but at the same time raised concerns that federal laboratories would be less likely to enter cooperative agreements with private industry. CRADAs are the most commonly used mechanism for technology transfer and if the US wants to continue to maintain successful technology transfer, then work needs to be done to understand where the strengthens and weaknesses

of CRADAs are and what types of reform, if any, are needed on US technology transfer models especially in an increasingly competitive global market.

I will address the following issues: technology transfer, competitiveness, the assets and limitations of CRADAs, and intellectual property. I will conclude by looking at the future of CRADAs and what policy changes can be made to further promote successful technology transfer from federal laboratories to private firms and how these policies interact on a global level.

C.10 Jonathan Krezel

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How to Cooperate When You Really Don't Care— The Agreements and Problems of the International Space Station

Multinational cooperation in the design, construction and operation of the International Space Station (ISS) is only the latest example of a growing trend towards greater collaboration in so-called “big science” projects. Given the current budget priorities and fiscal constraints on most of the world’s space powers, the multinational character of ISS probably represents the model by which any future, large-scale crewed space programs will be financed and managed.

While the inclusion of international partners saved the American space station *Freedom* from Congressional cancellation in 1993, the benefits to the partners since that time have been, at best, open to debate. In fact, the selling of the space station as an international endeavor meant to facilitate cooperation between the partners has in many ways soured those same relationships. A number of questions remain as to whether ISS is a forerunner, however flawed, of the way in which future missions to near-Earth orbits, the moon, Mars, and beyond will be carried out, or whether the difficulties of cooperation outweigh the benefits. Some of the more salient questions include:

- 1) How important is crewed space flight to the international partners and to the space programs of other countries?
- 2) What were the general expectations of the partners when they entered into agreements?
- 3) Does the framework established by the various ISS agreements accord with the relative importance that each partner country places on crewed space flight?

How are these issues of priorities and reciprocal obligations likely to play out given the station’s current cost-control problems?

C.11 Robin Auger
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Fairfax, VA

The Influence of Political Ideology On Public-Private Technology Collaboration in the United States

Technological innovation is increasingly occurring in partnerships, alliances and networks comprised of both public and private organizations. Public-private technology collaboration in the United States is interesting and important from a policy perspective, as it occurs despite a political culture that condemns direct government intervention in private sector profit making. Throughout U.S. history, the fundamental national political ideology has stressed the existence and maintenance of a “wall of separation” between the public and private sectors. It has been considered politically unacceptable for the government to be directly involved in activities whose explicit objective is the private sector’s commercial success. In reality, however, this “wall of separation” has been breached repeatedly throughout U.S. history by unambiguous misrepresentations, by changes in definitions, and by blurred language.

Public-private collaboration in technological innovation is increasingly seen as a panacea to providing competitive advantage to the U.S. private sector. Accordingly, public-private collaboration represents yet another breach in the rhetorical “wall.”

The ideology demanding the maintenance of a “wall of separation” continues to influence how discussion about public-private technology collaboration is framed and how specific policies and programs are defined. The primary goal of legislative efforts in this area and of those managing these collaborative programs is to continue to be able to define the line of separation between appropriate public and private sector activities and responsibilities. This paper traces the influence of this ideology on public-private collaboration undertaken to facilitate the innovation of commercial technologies in the United States during the post-World War II period.

THE LOCAL AND THE GLOBAL: A WORKSHOP FOR THE RISING GENERATION OF SCIENCE, ENGINEERING, AND TECHNOLOGY POLICY PROFESSIONALS

APRIL 13, 2002

SPEAKER BIOGRAPHIES

BARBARA ALLEN is the Director of the Graduate Program in Science and Technology Studies at Virginia Tech's Northern Virginia Center in the D.C. area. She has published numerous recent articles on citizen-scientist alliances in the environmental justice movement in journals and books including: *The Contemporary Justice Review*, *Michigan Feminist Studies*, *Transforming New Orleans and Its Environs* (ed. C. Colten), and *Technologies of Landscape* (ed. D. Nye). Her current research focuses on the social shifts in the digital architectural (multi-national) workplace. She is also the executive editor of the *Journal of Architectural Education* published by MIT press

RICHARD E. BISSELL is the Executive Director of the Policy and Global Affairs Division of the National Research Council and Executive Director of the Committee on Science, Engineering, and Public Policy (COSEPUP) at the National Academies in Washington, D.C. Rich most recently headed the organizing secretariat of the World Commission on Dams, a joint initiative of the World Bank and the World Conservation Union. During 1994-1997, he was a founding member and chair of the Inspection Panel of the World Bank. During the years between 1986-1993, he was Assistant Administrator at the US Agency for International Development, first as head of the Bureau of Policy and Program Coordination, and later head of the Bureau of Research and Development. He has held a variety of teaching and research positions in universities and think tanks, including Johns Hopkins University, Georgetown University, The American University, and the University of Pennsylvania, and has published seven books and numerous articles on issues of international institutional and policy change. His B.A. is from Stanford, and his Ph.D. from Tufts University.

DARYL CHUBIN is currently Senior Vice President for Policy and Research at NACME, the National Action Coalition for Minorities in Engineering. He previously spent nearly 15 years in federal service at the Office of Technology Assessment, the Office of Science and Technology Policy and the National Science Foundation. Dr. Chubin has served on the faculty of numerous universities, including Georgia Tech and the Northern Virginia Center of Virginia Tech. He has published seven books and numerous policy reports, articles, and commentaries, including *Science, Technology, and Society: A Sourcebook on Research and Practice* (co-edited, 2000). He is co-editor, with Dr. Willie Pearson Jr., of *Scientists and Engineers for the New Millennium: Renewing the Human Resource*, a collection of the Commission on Professionals in Science & Technology. More information about Dr. Chubin can be found at <http://www.nacme.org/about/officers/chubin.html>.

SUSAN COZZENS is Professor and Chair of the School of Public Policy at the Georgia Institute of Technology. Her current research is on science, technology, and inequalities, and she is active internationally in developing methods for research assessment and science and technology indicators. From 1995 through 1997, Dr. Cozzens was Director of the Office of Policy Support at the National Science Foundation. Dr. Cozzens has served as a consultant to a variety of science policy institutions and associations. Her Ph.D. is in sociology from Columbia University (1985) and her bachelor's degree from Michigan State University (1972, summa cum laude). She is a recipient of Rensselaer Polytechnic Institute's Early Career Award, a member of Phi Beta Kappa and Phi Kappa Phi, and a Fellow of the American Association for the Advancement of Science. More information about Dr. Cozzens can be found at www.spp.gatech.edu/people/faculty/scozzens.htm

JOHN FORRER is currently Director of the George Washington University Center for the Study of Globalization in Washington, DC. He is also Executive Director of the University's Institute for Global Management and Research, and an Assistant Research Professor of International Business. Dr. Forrer has extensive experience as a project manager and research for governmental (both state and federal) and private organizations. He has written extensively on environmental technology and technology policy. More information about Dr. Forrer can be found at <http://www.gwu.edu/~gwccsg/forrer.htm>

VICTORIA FRIEDENSEN is Special Assistant to the Deputy Associate Administrator, Office of Space Science, NASA. On a detail from the National Academy of Engineering, Ms. Friedensen specializes in policy development and risk communication management for NASA's Nuclear Systems Initiative. As program officer for the Academy, Ms. Friedensen was responsible for the Academy's ongoing program to develop changes in the science and engineering workforce for the 21st century. She also spends her time, for the Academy and NASA, in thinking about long term technology development and acceptance, and resulting impacts for the space program. She holds degrees in anthropology and science and technology studies. Ms. Friedensen is a doctoral candidate in science and technology studies at Virginia 'Tech where she is focusing on cultural studies of risk within the context of technologies to support human presence in space.

JEAN FRUCI has recently returned to Capitol Hill as a professional staff member of the House Committee on Science after serving as the Assistant Director of Science for the Pew Initiative on Food and Biotechnology. Previously, Dr. Fruci had served for five years as a professional staff member of the House Committee on Science where was responsible for environmental science and technology programs within the Committee's jurisdiction including risk assessment, regulatory reform, and other government policies. From 1994 to 1995, Dr. Fruci was a science fellow on the staff of Representative George E. Brown, Jr. (D-CA) and provided legislative advise in the areas of agriculture, resource management, energy and the environment. Prior to her congressional career, Dr. Fruci was a graduate student and research assistant in the Dept. of Soil, Crop, and Atmospheric Sciences at Cornell University in Ithaca, NY. Dr. Fruci received her Ph.D. in soil science from Cornell University.

DAVID GUSTON is associate professor of public policy and director of the Edward J. Bloustein School of Planning and Public Policy at Rutgers, the State University of New Jersey. Guston is the author of *Between Politics and Science: Assuring the Integrity and Productivity of Research* (Cambridge University Press, 2000), co-author of *Informed Legislatures: Coping with Science in a Democracy* (with M. Jones and L.M. Branscomb, University Press of America, 1996) and co-editor of *The Fragile Contract: University Science and the Federal Government* (with K. Keniston, MIT Press, 1994). He received his B.A. from Yale and his Ph.D. in political science from MIT. Prior to going to Rutgers, he worked at the Office of Technology Assessment and at the National Academy of Sciences. Guston's research interests include science and technology policy, the role of experts and policy analysis in democratic decision-making and legislative processes and organization. More information about Dr. Guston can be found at: <http://www.rci.rutgers.edu/~guston/>

KERRI-ANN JONES has extensive international science and technology policy and program experience, having worked at the White House Office of Science and Technology Policy (OSTP), the U.S. Agency for International Development (USAID), the National Institutes of Health (NIH) and the National Science Foundation (NSF). Her principal areas of expertise are biotechnology, health, international cooperation and technology commercialization. Prior to U.S. Government service, Dr. Jones worked as an independent consultant in international development and science and technology. She served for a year in New Delhi, India, as the Biotechnology Advisor to the USAID mission, and in 1985 was the recipient of a AAAS Science, Engineering and Diplomacy Fellowship. Dr. Jones obtained her Ph.D. from the Department of Molecular Biophysics and Biochemistry at Yale University, and holds a bachelor's degree in chemistry from Barnard College, Columbia University

TODD LAPORTE is a visiting associate professor at George Mason University, and at the Delft. He was a member of the permanent staff at Faculty of Technology, Policy and Management at the Delft University of technology in the Netherlands from 1996 to 1998.

Previously, La Porte served for six years as an analyst in the information technology and the international security programs at the Office of Technology Assessment, a research office of the U.S. Congress. His work at the OTA focused on the role of wireless telecommunications and the National Information Infrastructure, international trade in telecommunications services and U.S. policy, and international defense industrial cooperation and the arms trade.

His current research interests are in electronic governance and the use and impacts of information technologies in the public sector, both domestically and at the international level. He is a founding member of the Cyberspace Policy Research Group (<http://www.cyprg.arizona.edu>), which was established under a National Science Foundation grant in 1997. In addition, he has published work in public organizational challenges of the Web

disaster assistance, on European technology assessment methodologies and practices, and on the social implications of telecommunications mobility. La Porte teaches international Internet public policy, and technologies, organizations and politics. Recently he received a grant from the Pew Project on the Internet and American Life to continue his CyPRG work, focusing specifically on the U.S. Federal Government.

La Porte received his Ph.D. in Political Science from Yale University in 1989, with concentrations in the policy sciences and public administration, comparative politics, and European politics. His undergraduate degree in sociology and political science is from Swathmore College.

SHIRLEY MALCOM is currently head of the AAAS Directorate for Education and Human Resources (EHR) Programs. Dr. Malcom has taught at both the university and high school levels and was a National Science Foundation Program Officer in science education. She served on the National Science Board and as a member of the President's Committee of Advisors on Science and Technology during the Clinton Administration. She is author or co-author of numerous publications including *Science Assessment in the Service of Reform* (Lawrence Erlbaum 1994). More information about Dr. Malcom can be found at www.aaas.org/ehr/slic/bios.html#malcom.

MICHELLE McMURRY Dr. McMurry attended Harvard University where she majored in Biochemistry and conducted research in bacterial genetics. She participated in the Medical Scientist Training Program at Duke University and received her M.D. and Ph.D. degrees in 2000. Her graduate work was in Immunology and focused on gene recombination in T Cells. Upon graduation she received an AAAS/NSF Science Policy Fellowship. She spent her fellowship working in the Office of the Director at NSF, focusing on science education issues. She returned to the clinics to work in Pediatrics and Medical Genetics and she is currently completing a health policy fellowship in the Office of Senator Joseph Lieberman of Connecticut.

NORMAN NEUREITER Science and Technology Adviser to the Secretary of State Dr. Norman P. Neureiter was sworn in as Science and Technology Adviser to the Secretary of State on September 19, 2000. A PhD organic chemist (Northwestern University), Dr. Neureiter has extensive experience in government and industry, and a public policy background that includes close ties to academia. Since taking early retirement in 1996 from Texas Instruments (TI), where he was Vice President of TI Asia, Dr. Neureiter has served as U.S. co-chair of the U.S.-Japan Joint High Level Advisory Committee, a body of leading university and industry representatives that advises the U.S. and Japanese governments on science and technology (S&T) matters under the auspices of the U.S.-Japan Science and Technology Agreement. Concurrently, he served as a U.S. Commissioner of the Maria Sklodowska-Curie Joint Fund II, which supports cooperative S&T research between Polish and U.S. scientists under the U.S. Science and Technology Agreement with Poland.

In 1998, Dr. Neureiter was appointed to the Committee on International Space Programs of the National Academy of Sciences/National Research Council's Space Studies Board. Dr. Neureiter has also served as Director (and past president) of the Dallas Council on World Affairs, a Director (and past president) of the Japan-America Society of Dallas/Fort Worth, and Vice-Chairman of the Board of the Council on International Educational Exchange (CIEE) in New York. From 1973 to 1996, Dr. Neureiter held a variety of positions in Texas Instruments, including Director of East-West Business Development, Manager of International Business Development, and Manager of the TI Europe Division. As Vice President for Corporate Staff, he was the company's principal spokesperson throughout the world from 1980-1989. From 1989 until 1996, he served as a Director of TI Japan, and Vice President of TI Asia. Prior to his work with private industry, Dr. Neureiter worked as International Affairs Assistant in the White House Office of Science and Technology during 1969-1973, reporting to the President's Science Adviser. In this capacity, he was deeply involved in preparing agreements on cooperation in science and technology initiated in 1972-1973 by President Nixon with the leaders of the Soviet Union and the People's Republic of China.

ROBERT RYCROFT received his Ph.D. in Political Science in 1976 at the University of Oklahoma. During the last four years of his doctoral work and for a year after he completed the Ph.D., he worked first as a Research Associate and then as a Research Fellow in the Science and Public Policy (S&PP) Program at O.U. His research at the S&PP focused on U.S. energy research and development policy. He then took a one-year post-doctorate as a John Parker Compton Visiting Fellow at Princeton University's Center for International Studies, Woodrow Wilson School of Public and International Affairs.

Professor Rycroft was on the faculty of the Technology, Modernization, and International Studies Program, Graduate School of International Affairs, University of Denver, between 1978 and 1981. There he taught and conducted research in the management and planning of technological projects. In 1981, Professor Rycroft came to what is now the George Washington University's Center for international Science and Technology Policy (CISTP), Elliott School of International Studies. His teaching and research at the CISTP have focused on the areas of science, technology, and international affairs, environment and international affairs, and science, technology and complexity.

Dr. Rycroft has coauthored nine books, the most recent of which is *The Complexity Challenge: Technological Innovation for the 21st Century* (with Dan Kash). He and his coauthors have published more than fifty articles and book chapters. His articles have appeared in *Research Policy, Issues in Science and Technology, Science and Public Policy, R&D Management, Technology Review, Technological Forecasting and Social Change, Technology in Society, Research-Technology Management* and a host of others.

TOBIN SMITH is Director of Federal Relations for Research and Assistant Director of the University of Michigan Washington Office. Prior to coming to U-Michigan in 1999, Smith served as the Assistant Director for the Massachusetts Institute of Technology (MIT) Washington Office where he began working in 1992. As a federal government relations representative for Michigan and MIT, Smith has been engaged in science policy discussions across a broad range of issues and has maintained regular interactions and liaison with key policy makers on Capitol Hill, in the White House and within key federal science and research agencies including the NIH, NSF, Department of Energy, Department of Defense and NASA. From 1988 to 1992, Smith served as a legislative assistant to Congressman Bob Traxler (D-Michigan). Smith first came to Washington to work as a summer intern on Capitol Hill for the Northeast-Midwest Congressional Coalition. Smith holds an MA in Legislative Affairs from the George Washington University, and a bachelor's in General Studies from the University of Michigan.

SHERRI STEPHAN received her bachelor degree in astronomy and physics from Vassar College 1993, and masters and doctorate degrees in astronomy from Boston University in 1997 and 2000, respectively. While working in the Center for Space Physics at Boston University, she built and launched sounding rocket experiments to study the interaction between the solar wind and nearby interstellar environment. Dr. Stephan currently works on Capitol Hill with the Senate Governmental Affairs Subcommittee on International Security, Proliferation, and Federal Services. She began working with the Subcommittee in September 2000 as an American Physical Society Congressional Science Fellow. Dr. Stephan became a professional staff member on the Subcommittee upon completion of her fellowship in September 2001. Her primary issues on the subcommittee staff include missile defense, chemical and biological weapons, nuclear proliferation, homeland security, terrorism, space management, aerospace and dual use technologies.

BRANT SPONBERG covers NASA programs as an examiner for the President's Office of Management and Budget. Brant joined OMB five years ago and has primary responsibility for NASA's Space Science Enterprise and launch vehicle and spacecraft technology programs. Brant also has lead responsibilities in generating the President's annual budget request to Congress for NASA and in reviewing NASA planning and management. Brant earned his master's in science, technology, and space policy from George Washington University and his bachelor's in astrophysics and the history of science from Harvard University. Brant resides in Maryland with his wife and their two cats, one of which Brant named after a lunar mission against his wife's better wishes.

MICHAEL TWERY is a Health Scientist Administrator in the National Heart, Lung, and Blood Institute (NHLBI), Division of Lung Diseases. He leads the sleep and respiratory neurobiology scientific research group and is currently the project officer for the multi-site Sleep Heart Health Study of cardiovascular risks associated with sleep apnea. Dr. Twery is also the NHLBI representative to the NIH Bioinformatics Biomedical Information Science and Technology Initiative Consortium (BISTIC) and chairs the NHLBI Bioinformatics Working Group. He has previously served as Acting Director, National Center on Sleep Disorders Research (NCSDR), and continues as the lung division liaison to the NCSDR and to the Trans-NIH Sleep Research Coordinating Committee. Dr. Twery received his Ph.D. training in Pharmacology at the University of North Carolina, Chapel Hill. He was a member of the research faculty at the University of Texas Medical Branch and a Senior Staff Fellow at the National Institute of

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