Politics of Science and Innovation Policy: Workshop Report

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Executive Summary

This is a report of a workshop held on March 17 and 18, 2016 at the Brookings Institution in Washington, DC. Funding for this workshop was provided by the National Science Foundation. The workshop brought together leading scholars and practitioners in the science of science and innovation policy (SciSIP) to develop a research agenda on the *politics of science and innovation policies (SIPs)*.

Thinking about the politics of SIPs led the group to a crucial question: What ends are pursued through science and innovation policy? It is important to discuss the merits of one or another vision for SIPs, but from a political analysis perspective, what is important is to observe that the various ends reflect political positions of (i) groups brought together by common policy interests, (ii) whose normative views of proper ends are congruent with specific mental models of the society-science system, and (iii) whose interests are governed by characteristic political economies.

Participants suggested that the analysis that results from studying SIPs from a political angle can be pursued productively from at least three perspectives. The *institutional perspective* would examine whether political pluralism in SIP debates slows socio-technical change, and if so, does greater inclusion lead to more democratically responsive reform? Is expediency always contrary to democratic forms of change? Another useful perspective is that of *interest groups.* From universities looking to increase their federal grants, to local industries seeking a competitive edge in the global marketplace, to government contractors expecting continued patronage, how do local interests exert political influence on SIPs? A third perspective that would resonate with policymakers is more directly that of *hot-button issues.* These include net neutrality, patent policy, scientific workforce and immigration issues, performance indicators, and of course budget issues. What have been the key political variables and factors influencing these and other current areas of SIP decision making?

The aim of the workshop was to articulate key research themes and questions that can help guide systematic future scholarship about the interactions between politics and science policy design, a neglected area of SciSIP scholarship. Four subordinated aims were accomplished. The workshop:
1) helped build a community of scholars focused on improving our understanding of the interactions between politics and SIPs;
2) articulated research needs and opportunities related to the politics of SIPs;
3) contributed to building capacity in the relevant community of scholars for developing compelling and valuable research proposals and projects on questions related to the politics of SIPs; and
4) provided input to NSF's SciSIP program with a research agenda that can enhance its capacity for identifying, soliciting, and funding high-impact research on the politics of SIPs.

Workshop Agenda

March 17-18, 2016
The Brookings Institution
1775 Massachusetts Ave NW
Washington, DC 20036

The primary goal of this workshop is to produce a set of interesting questions for the community of researchers and practitioners working on science and innovation policy. Our questions are different to those of other agenda setting workshops in that we emphasize the politics of policy in this domain.

A workshop in three parts
After introductory remarks, the first session sets the agenda and proposes two perspectives of science and innovation policy, that of the politicians and that of scientists. The last session is designed to put it all together and collect notable questions. The longer part in the middle is devoted to four "commandments" of science and innovation policy, and seeks to anchor the discussion around the politics of this wisdom.

Thursday, March 17

8:30 AM   Arrival, registration, and breakfast.

9:00 AM   *Prologue*
Introductions all around and ground rules.

9:30 AM   *Opening Remarks*
Daniel Sarewitz: *Does science and innovation policy matter?*
Walter Valdivia: *Some thoughts on the politics of policy*

10:00 AM   *Session 1 – What's the talk on Mount Sinai?*
Two vantage points examined.

David Goldston: *What do politicians believe about science & innovation policy?*
Colin Macilwain: *What do scientists believe about science & innovation policy?*

Plenary discussion.

11:00 AM   Coffee break.

11:20 AM *Session 2 – Commandment 1: "Science and innovation policy must foster economic growth"*

This commandment has driven much of science and innovation policy at least since the 1980s but what are the politics behind trying to cultivate and capture these gains? What are the politics of innovation's distributional outcomes? What are the politics behind innovation policy targeted to foster growth in different economic sectors, industries, and regions? In this session we should explore the political forces of "economic growth" and related goals such as "job creation" in innovation policy. Apart from the occasional hot button issue (stem cells) or program (ATP), do the two parties share growth agendas? Or is growth sufficiently versatile to give cover to different political agendas? And who has this received wisdom left out of the debate? If economic growth has come to be fully accepted as the dominant rationale for R&D, what kind of political program could allow a competing goal to emerge?

Provocateurs: Beth Popp-Berman and Zak Taylor

Panelists: Fred Block, William Bonvillian, Mark Muro, Phillip Wallach

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12:40 PM Lunch.

1:30 PM Optional group walk.

2:30 PM *Session 3 – Commandment 2: "R&D funding, and the number of scientists, must forever grow"*

The underlying proposition is that "more money for science and more scientists devoted to R&D automatically translate into better social outcomes." Of course, such received wisdom is confirmed by its own political dynamic. The science lobby (including the university lobby) insists that stable or declining budgets do not serve the national interest, and increasing ones do. Are corporations increasingly on board with this message? What sort of politics do the R&D agencies engage in to advance their own interests? The social benefits of marginal increases in R&D budgets are famously difficult to nail down. But it should be easier to figure out who directly benefits from rising R&D budgets and a growing cadre of scientists. Can there be a useful science of science and innovation policy without a basic understanding of science and innovation politics?

Provocateurs: Thomas Stossel and Susan Fitzpatrick

Panelists: Erin Cadwalader, Robert Cook-Degan, Monica Gaughan, David Winickoff

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3:50 PM Coffee break.

4:10 PM *Session 4 – Commandment 3: "Patents shall be protected and information shall be free"*

The underlying proposition is that "patents are the sine qua non for innovation." But patents also stifle innovation. One burning political question is then: what innovation is worth promoting and what is worth constraining in a patent regime. What are the political dynamics behind the strengthening of patent protection during the 1980s and 1990s, and the subsequent challenges to the regime from intellectual, business, and political fronts in the new century? How and why have the sides aligned around patent zealotry versus open information idolatry? Is this a political divide? Are we transitioning from one regime to the other? Is there any conceptual or political coherence to what lies on one side or the other?

Provocateurs: Arti Rai and Michael Calabrese

Panelists: Susan Hennessy, Shobita Parthasarathy, Bhaven Sampat, Tania Simoncelli

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5:30 PM Break.

7:00 PM Dinner: Ankara, 1320 19th Street NW, Washington DC.

Beth Robinson: *Inside the Politics of Science and Innovation Policy*

Friday, March 18

8:30 AM Continental breakfast.

9:00 AM *Session 5 - Commandment 4: "The government shall not infringe upon the freedom of the markets, except for ... [insert favorite technology]"*

The political culture of the U.S. celebrates the role of private initiative in fostering innovation, and basic research gets bipartisan support because all agree it is justified by market failure. Democrats are usually more willing to venture downstream than Republicans, but in the end every member of Congress wants to funnel money to favorite agencies, projects, universities, and companies. How do various scientific constituencies participate in these games? Does the politics of the local trump any effort to develop national innovation strategies? And if so, do we know if that's bad? Or is it just a policy design criteria? And if it's bad now, do we know if it's ever been better? Is science and innovation policy possible?

Provocateurs: Michael Holland and John Alic

Panelists: Jason Day, Virginia Eubanks, David Hart

10:50 AM   Coffee break.

11:10 AM   *Session 6 – Bringing it all together*
Notable questions that came out of (or were neglected in) workshop discussions.

    Barry Bozeman: *Ten questions for researchers*
    William Galston: *Ten questions for practitioners*

Plenary discussion.

12:20 PM   End of workshop. Participants are invited to stay for lunch and informal discussion.

Workshop Participants

John Alic
Independent scholar of technological change and innovation

Fred Block
Research Professor of Sociology at the University of California at Davis and co-author (with Margaret R. Somers) of The Power of Market Fundamentalism: Karl Polanyi's Critique *(2014)*

William Bonvillian
Director of the Massachusetts Institute of Technology's Washington, DC office and co-author (with Charles Weiss) of Technological Innovation in Legacy Sectors *(2015)*

Barry Bozeman
Arizona Centennial Professor of Public Management and Technology Policy and Director of the Center of Organizational Research and Design, Arizona State University

Michael Calabrese
Director of the Wireless Future Project at New America's Open Technology Institute

Erin Cadwalader
Government Relations Associate at Lewis-Burke Associates, LLC

Robert Cook-Deegan
Research professor in the Sanford School of Public Policy, Duke University

Jason Day
Legislative Director, Congressman Daniel Lipinski

Maryann Feldman
Heninger Distinguished Professor in the Department of Public Policy at the University of North Carolina

Virginia Eubanks
Cofounder of Our Knowledge, Our Power (OKOP) and professor at the University at Albany, SUNY

Susan Fitzpatrick
President of the James S. McDonnell Foundation

William Galston
Senior fellow at the Brookings Institution's Governance Studies Program and professor at the University of Maryland

Monica Gaughan
Associate Professor in the School of Human Evolution and Social Change at Arizona State University

David Goldston
Director of government affairs for the Natural Resources Defense Council

David Hart
Professor and Director of the Center for Science and Technology Policy at the School of Policy, Government, and International Affairs (SPGIA) at George Mason University

Susan Hennessey
Fellow in National Security in Governance Studies at the Brookings Institution

Mike Holland
Executive Director of New York University's Center for Urban Science and Progress

Colin Macilwain
Editor of the science policy newsletter Research Europe, *associate editor of its sister publication,* Research Fortnight, *and columnist for* Nature

Mark Muro
Fellow and the director of policy for the Brookings Institution's Metropolitan Policy Program, and research director of the Brookings Mountain West Initiative

Shobita Parthasarathy
Associate Professor of Public Policy and Women's Studies at the University of Michigan and author of Building Genetic Medicine: Breast Cancer, Technology, and the Comparative Politics of Health Care *(2007)*

Elizabeth Popp-Berman
Associate Professor of Sociology at the University at Albany, SUNY and author of Creating the Market University: How Academic Science Became an Economic Engine *(2012)*

Arti Rai
Elvin R. Latty Professor of Law and co-director, Duke Law Center for Innovation Policy

Beth Robinson
Director of Finance and Chief Financial Officer of the Air Line Pilots Association, International (ALPA)

Bhaven Sampat
Associate professor in the Department of Health Policy and Management at Columbia University, affiliated faculty member at Columbia Law School, and research associate at the National Bureau of Economic Research

Daniel Sarewitz
Cofounder & co-director of the Consortium for Science, Policy & Outcomes (CSPO), and Professor of Science and Society at the School for the Future of Innovation in Society, Arizona State University

Tania Simoncelli
Senior Advisor to the Director of the Broad Institute of the Massachusetts Institute of Technology and Harvard University

Tom Stossel
Director of the Translational Medicine Division and senior physician in hematology at Brigham & Women's Hospital, Harvard Medical School, and visiting scholar at the American Enterprise Institute

Mark Zachary Taylor
Associate Professor of International Affairs at the Sam Nunn School of International Affairs, Georgia Institute of Technology, and author of The Politics of Innovation *(2016)*

Walter Valdivia
Non-resident fellow in the Center for Technology Innovation at Brookings.

Philip Wallach
Senior fellow in Governance Studies at the Brookings Institution

David Winickoff
Director of the Berkeley Program in Science & Technology Studies

Full biographies of workshop participants can be found in Appendix E.

Workshop Report

Workshop deliberation: Motivations

A recurrent question during workshop deliberations was how to assess the "political feasibility" of a policy recommendation. Empirical analysis could perhaps seek to establish the probability of successfully enacting a policy idea. Quickly we would realize that this question really means the probability of success of the specific strategy proposed to enact policy and how effectively the proponents followed their strategy. But this leads us to consider the elements of political strategy. For instance, how to assemble a package that involves concessions to attract key supporters and minimize opposition, or in other words, how to build a coalition? In making concessions, how far can we go before the core idea is lost? Another question of strategy, interdependent with the foregoing, is how to frame the problem? The sequence and timing of building a coalition also matters to its success. Compounding the complexity of the political feasibility analysis is the question of how all this fits into the election cycle? This sort of reasoning seems to present a challenge to the standard methodological approaches to study policy. We talk about science and innovation policies (SIPs) as if their existence reflects the articulation of coherent prescriptions and their implementation in turn follows those prescriptions. A moment's reflection on politics shows why this view of policy is far from reality.

Taking a historical perspective can be instructive. In 1967, Yehezkel Dror optimistically declared in the pages of *Public Administration Review* how the new field of policy analysis would distinguish itself from the then in vogue systems analysis approach:

> Much attention would be paid to the political aspects of public decision-making (instead of ignoring or condescendingly regarding political aspects). This means much attention to problems of political feasibility, recruitment of support, accommodations of contradicting goals, and recognition of diversity of values (Dror, 1967, p. 200).

However successfully this aspiration might have been achieved in the subsequent decades of policy analysis scholarship, "the political aspects" of science and innovation policies have not been systematically investigated within the broad and heterogeneous field of science and technology policy. For example, a scan of proposals funded by NSF's Science of Science and Innovation Policy (SciSIP) program since its inception in 2006 revealed a single funded proposal that was explicitly focused on the politics of SIPs.[1]

While we certainly don't think that all useful analysis brought to bear under the SciSIP umbrella must be politically aware, systematic inquiry on the interaction between politics and policy design is clearly an important element of a maturing SciSIP field. After all, SIPs emerge from political decision-making processes. SIPs are implemented in political settings, are often aimed at addressing issues that are defined politically, and are often as-

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[1] Award #0829546 MOD: A Political-Economic Model of Opposition/Support for Science and Innovation Policies

sessed in a political environment. Understanding SIPs therefore means understanding their political aspects.

The workshop raised an array of questions that could together begin to constitute a research agenda for better understanding the politics of SIP development, implementation, evolution, and assessment. (Hereafter, will use the term "SIP design" as shorthand for this encompassing range of activities, after Ingram and Schneider, 1997). Such a research agenda could address the types of questions faced by decision makers who are tasked with crafting future SIPs and improving existing ones.

The policy foundations of today's U.S. science and innovation enterprise are recognized as emerging in significant part from the terms of the post-World War II political debate between Vannevar Bush and Harley Kilgore (e.g., Kevles, 1995) about the extent to which, and manner in which, science ought to be linked to the solution of national problems. This debate continues to this very day with the America Competes Act, just passed by the U.S. House of Representatives, which increases Congressional oversight over the National Science Foundation in ways that resonate with the Bush-Kilgore legacy and still provoke bitter political debate.[2] In the interim, SIPs have continually evolved in a political context that has significantly influenced the structure, priorities, and dynamics of the U.S. innovation system. Moreover, it's fair to say that many and perhaps most intersections between SIPs and politics are echoes not of the Bush-Kilgore debate but of the specific and often parochial contexts within which SIPS are debated and implemented (such as where to locate a major research facility like the Superconducting Super Collider, or which sets of political interests win out in efforts to reform patent policy.)

Scholars of the United States' SIPs are of course well aware of this political context and typically use it as a backdrop to their research. Politics has also been at the center of a range of scholarship that relates directly to the concerns of the SciSIP program. For example, some attention has been paid to the role of changing Congressional politics in SIPs (Lakoff, 1974; Slaughter and Rhoades, 2005); to "pork barrel" projects (Cohen and Noll, 1991); to the politics of the space program (McDougall, 1985) and of big projects like the SSC (Riordan, 2000), the national nanotechnology initiative (Bennett and Sarewitz, 2006; Fisher and Maricle, 2014) and the Human Genome Project (Cook-Deegan, 1996); to the politics of particular goals like developing an AIDS vaccine (Cohen, 2001) or curing breast cancer (Lerner, 2003); to the role of the public and interest groups in influencing SIPs (Moore, 2009; Epstein, 1996); and of course to the politics of budgets and budgeting (Wildavsky and Caiden, 2003; Sarewitz, 2007). Sapolsky and Taylor (2011) have even provided an account of the politics of the science of science policy.

The journalist Daniel Greenberg (1967; 2001) is especially notable for his efforts to provide a more sweeping view of the politics of science policy in two books separated by more than 30 years, and the more granular view of science politics provided by Greenberg's *Science and Government Reports* newsletter, which he produced from 1971-1997. David Goldston, a

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[2] http://www.aip.org/fyi/2015/house-passes-america-competes-bill

former congressional staffer, took up this tradition in 2007-2009 with a series of monthly columns for *Nature* that provided a micro-political insider view of SIP-making.[3] The issue of partisanship and science policy was addressed in the journalist Chris Mooney's tendentious book *The Republic War On Science* (Mooney, 2006).

Nonetheless, the role of politics in SIPs has by and large been neglected as a central theme of SciSIP scholarship, despite its inescapable presence at the core of all science and innovation policymaking. As just one small but typical example of this point, the Advanced Technology Program (ATP) at the National Institutes of Standards (Dept. of Commerce) was, throughout its life, the subject of continual political debate over whether it was, or was not, an appropriate intervention in the marketplace. While this political backdrop is referenced in many publications about ATP (e.g., Wessner, 1999), the politics themselves have not been the direct subject of scholarship. Yet in a brief presentation by Mary Good (2003), who oversaw ATP for four years during the Clinton Administration, she noted:

> In an attempt to create an evaluation system that was nonpolitical, the sponsor of ATP, the National Institute of Standards and Technology (NIST), has used reviewers without conflict of interest but with a real understanding of the technology. In fact, most of the reviewers have been recently retired scientists and engineers from universities or government agencies (except the Department of Commerce). However, the selection process becomes difficult when a small company involves its congressman and adds a political aspect to the selection process.

This fascinating little story conveys a strong sense of the complex interplay between politics and SIPs, and why understanding this interplay is important for a science of science and innovation policy.

Synthesis of workshop discussion

Thinking about the politics of SIPs led the group to a deeper and bigger question: What ends are pursued through science and innovation policy?

Some will answer that SIPs legitimately pursue particular visions of common betterment, such as producing cheap new drugs. Other will instead emphasize that the aim is to produce new knowledge and let markets do the rest. It may be important to discuss the merits of one or another answer, which is to discuss the merits of specific societal outcomes. But from a political analysis perspective, what is important is to observe that the various ends are political positions of (i) groups brought together by common policy interests, (ii) whose normative views of proper ends are congruent with specific mental models of the society-science system, and (iii) whose interests are governed by characteristic political economies.

An example of this is the policy of public funding of research. Conventional wisdom states that national competitiveness is tied to government investments in research and develop-

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[3] http://www.nature.com/nature/focus/partyofone/index.html?message=remove

ment (R&D), and specifically to basic science. We do not need to question whether science is in fact important to innovation to observe that even advocates of ever-increasing funding for science acknowledge that in terms of the practicality of new knowledge, only a few research programs yield economic benefit. Such advocates typically argue that in the absence of a clear measure of the practical potential of given research programs, it is best to allocate funds in programs of the highest intellectual merit.

What seems to be a sound policy position—and it may certainly be sensible—can be subject to political analysis following the reasoning proposed above. Who are those who advocate for greater public commitments for basic science? Do they have a mental model in which the causal chain of science-innovation-competitiveness is linear? Do they as a group benefit from upholding such a belief of the social system and, as a consequence, is their sincere advocacy a political cause that also benefits them professionally, institutionally, and economically? Notice that we are not suggesting that political analysis must pass judgment on advocates and their causes, but rather that it helps us understand how a particular view of policy causality articulates the interests of a political player in the debates of science and innovation. SciSIP could have an important role in supporting research that unpacks these dynamics.

A corollary of this reasoning is really an old lesson from political science: Empirical questions of import to policy are inherently normative questions.

Provocative topics for productive research

As part of the workshop format, we motivated each session with an introduction *qua* provocation led by an expert in that area (see agenda). The following is extracted from such provocations.

Science ends: Science has been devoted to simple questions like LIGO (the Laser Interferometer Gravitational-Wave Observatory), rather than complex ones, like delivering social solutions to a small rustbelt town. Would the scientific establishment, as a political actor, benefit from being more explicit about its ends vis-à-vis social challenges?

Firewall between science and society: There is an apparent firewall between SIPs aimed at expanding knowledge and innovation versus policies aimed at tackling real world social problems. Whose interests are protected by this firewall? Is this merely an ideological compartmentalization?

Political agendas of a different era: The manner in which SIPs are advocated by policymakers of each major political party continue to reflect Cold War agendas. Behind the policy-party alignment at the Congressional subcommittee level is, for instance, the Republican pursuit of lower taxes or the Democratic protection of labor. But is this alignment also useful to meeting the challenges the post-Cold War era, in terms of globalization, inequality, and security?

The limits of growth: The proposition that priming the R&D pump will guarantee long-term economic growth has been tested in the 2008 crisis. But until then it had served well the

research contractors of the federal government. What alternative has emerged to that proposition?

Innovation and inequality: How the benefits of innovation are distributed has not been prominent issues in the SciSIP agenda. Why not? Is innovation in the U.S. disproportionately contributing to wealth concentration? If that is true, are effective SIPs subject to being seen as sources of deepening inequality? If voters and politicians are becoming increasingly interested in distributional questions, SciSIP may have an opportunity to productively contribute knowledge that can inform political debate and policy options.

Research-societal outcomes linkages: Empirically, the connection between public investments in biomedical research and better public health indicators has not been established. Who is served by that vacuum of knowledge? Can SciSIP remediate this gap in our understanding of innovation?

Private decisions shape pubic decisions: The private sector is an important player in shaping R&D policy. If we gain an understanding of how businesses make decisions about R&D, we can better produce a normative theory for public R&D investment, considering that under the public good logic, the public sector fills in the gaps left by the private sector.

Political analysis for empirically intractable questions: The debate about intellectual property protection and open innovation goes back to the founding of the Republic. The tension between these two views cannot be settled empirically for the totality of the economy, precisely because of the entrenched institutional history of both idealized models of innovation. The question of how intellectual property should be protected thus has an inherently political component that SciSIP could investigate: Who is attracted to, and advocating for, particular models of IP governance?

The realpolitick of "industrial policy" and its impact on SIPs: The U.S. government has practiced, and continues to practice, what could reasonably be termed "industrial policy" in the service of national goals like defense, food security, and shoring up of particular sectors. But a bipartisan political aversion to industrial policy as an affront to the autonomy of both science and markets means that the public role in steering innovation outcomes is often not acknowledged as such. How have such attitudes influenced the evolution of SIPs? What political and cultural factors have allowed the government to pick winners and losers in some areas and not others? How do industrial and other interests play into the political dynamics that permits or disallows that "picking winners."

The political economic motives of industry: Industry has been able to get out of the business of education of the labor force and now is getting out the business of basic research. How are such secular trends a response to SIPs, and how have SIPs responded to such trends?

Do the best ideas come out of scarcity or plentitude?: It is a truism that resource scarcity leads to scientific conservatism, but what is the evidentiary basis for such a belief, and who benefits from it?

The politics behind the rise of research metrics: What claims have been made on behalf of metrics, are those claims well supported, and who has benefited from them? What benefits may have been lost from the crowding out of other types of evaluation, and who may have been adversely affected as a result?

The politics behind calls for "sound science" and "evidence-based" policy: What are the respective roles of knowledge producers (scientists) and diverse end-users in such discussions? How do the politics of such discussions in turn influence SIPs and the organization of research?

What has happened to the best ideas from policy research?

SciSIP scholarship regularly produces policy ideas, but if and when these ideas enter the policy debate they elicit political reactions and become part of political rhetoric, and therefore, part of the politics of policymaking. Should recommendations from social research anticipate the political life of an idea? Must honest brokers be politically savvy to be effective brokers?

On the other side of the supply of ideas is the fact that SIPs themselves are at most a small element of a broader political ecosystem. Workshop deliberations led us to ask: What is known about the links between the national political environment, the development and implementation of SIPs, and the effectiveness of SIPs? How important is broad ideology in SIP debates in Congress? How significant are the political commitments of the President for development and implementation of SIPs in the executive branch? How much do SIPs change when party power alignment changes? How does the allocation of R&D funds change depending on the fiscal budget politics? Do scientists in Congress behave differently than other legislators with regard to SIPs?

These rich and general research questions inform the research agenda (next section) emerging from the workshop, but before elaborating that agenda, it is worth noting other important questions that emerged from various perspectives:

- *Institutional perspective*: How do various institutional arrangements permit (or obstruct) constructive political debate about the possible social implications of SIPs? Does political pluralism in SIP debates slow socio-technical change, and if so, does greater inclusion lead to more democratically responsive reform? Is expediency always contrary to democratic forms of change?
- *Interest group perspective:* From universities looking to increase their federal grants, to local industries seeking a competitive edge in the global marketplace, to government contractors expecting continued patronage, how do local interests exert political influence on SIPs, and what are the consequences of these dynamics for science and innovation? How are the benefits of SIPs distributed among local constituencies? How does political advocacy related to science, e.g., via professional societies, industry groups, cure-of-disease groups, and so on, influence SIP design and outcomes?
- *Hot-button issue perspective*: Certain SIP issues have in recent years mobilized particularly energetic political activity. These include net neutrality, patent policy, sci-

entific workforce and immigration issues, performance indicators, and of course budget issues. How has politics aligned around these debates, and what have been the key political variables and factors influencing these and other current areas of SIP decision making?

Who is buying SciSIP ideas?

One important theme that emerged and persisted throughout the workshop was that political framings of and rationales for various approaches to SIPs invoked by political actors (elected officials, appointees, advocates, lobbyists, etc.) are often not consistent with the state of SciSIP scholarship. In fact, political actors often evince much more certainty about things than our state of knowledge would support.

This raises a generic research question, and a generic SIP recommendation.

- The general research question is: What do political actors believe about the value and effectiveness of key SciSIP policy tools for advancing desired social goals? Do those beliefs vary systematically by political role, party affiliation, or ideological perspective?

- The general policy recommendation is: Develop and disseminate a brief report summarizing what is known and what is uncertain about the connections between a variety of key science and innovation policies and the achievement of desired social goals.

The group identified several specific areas where political beliefs about the effectiveness of science and innovation policies were not in tune with the state of knowledge in the SciSIP community. This leads to several specific versions of the general question and recommendation:

The government role in innovation to date
- *Research question*: What do political actors believe about the role that government has actually played in advancing technological innovation since World War II? Do those beliefs vary systematically by political role, party affiliation, or ideological perspective?
- *Policy recommendation*: Develop and disseminate a brief report summarizing what is known and what is uncertain about the role of government in advancing technological innovation since World War II.

Government R&D investments and social outcomes
- *Research question*: What do political actors believe about the connections between public R&D investments in particular fields (such as biomedical science), and the capacity of those fields to contribute to beneficial social outcomes (such as better public health)? Do those beliefs vary systematically by political role, party affiliation, or ideological perspective?
- *Policy recommendation*: Develop and disseminate a brief report summarizing what is known and what is uncertain about the connections between public R&D invest-

ments and desired outcomes, and especially the benefits of marginal increases in those investments.

Patents and innovation
- *Research question*: What do political actors believe about the importance of patents for stimulating technological innovation? Do those beliefs vary systematically by political role, party affiliation, or ideological perspective?
- *Policy recommendations*: Develop and disseminate a brief report summarizing what is known and what is uncertain about the strengths and weaknesses of patents for stimulating technological innovation, as well as other consequences of patent policies.

R&D investments and economic growth
- *Research question*: What do political actors believe about the role of public R&D investments and in stimulating economic growth? Do those beliefs vary systematically by political role, party affiliation, or ideological perspective?
- *Policy recommendation*: Develop and disseminate a brief report summarizing what is known and what is uncertain about the contribution of public R&D investments of different types to economic growth.

R&D policies and jobs
- *Research question*: What do political actors believe about the connections between science and innovation policies and job creation? Do those beliefs vary systematically by political role, party affiliation, or ideological perspective?
- *Policy recommendation*: Develop and disseminate a brief report summarizing what is known and what is uncertain about how science and innovation policies influence job creation.

State- and regional-level science and innovation policies
- *Research question*: What do political actors, especially at the state level (governors and state legislators) believe about the effectiveness of state- and regional-level science and innovation policies to stimulate economic activity? Do those beliefs vary systematically by political role, party affiliation, or ideological perspective?
- *Policy recommendation*: Develop and disseminate a brief report summarizing what is known and what is uncertain about the effectiveness of state level policy to stimulate or create innovative capacity at the state or regional level.

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Appendix E

Workshop Participant Biographies

John Alic

John Alic is a long-time student of technological change and its ramifications. He has taught at several universities and worked at the congressional Office of Technology Assessment for most of its existence. Alic is coauthor of *New Rules for a New Economy: Employment and Opportunity in Postindustrial America* (1998) and *Beyond Spinoff: Military and Commercial Technologies in a Changing World* (1992). His book *Trillions for Military Technology: How the Pentagon Innovates and Why It Costs So Much* appeared in 2007. In 2013 *The Rightful Place of Science: Biofuels* became the second volume in CSPO's ongoing series.

Fred Block

Fred Block is Research Professor of Sociology at the University of California at Davis. His recent work has focused on documenting the substantial role that the U.S. government plays in technology development across the civilian economy. During the last thirty years while policymakers and pundits were singing the praises of "free markets", the reality was that the public sector significantly expanded its efforts to move research breakthroughs from the laboratory to the market. His book, *State of Innovation: The U.S. Government's Role in Technology Development*, co-edited with Matthew R. Keller (Paradigm Publishers) contains a series of case studies that document different dimensions of this recently constructed innovation system. His newest book was published by Harvard University Press in 2014. It is called: *The Power of Market Fundamentalism: Karl Polanyi's Critique* and it is written with Margaret R. Somers. This book seeks to explain and critique the market fundamentalist worldview that has dominated our politics for the last thirty years. His current research centers on the kinds of financial reforms and new institutions required to supports innovation in this new context of public-private collaboration. His earlier books include *The Origins of International Economic Disorder* (1977), *Postindustrial Possibilities* (1990), and *The Vampire State* (1996).

William Bonvillian

William B. Bonvillian has been Director of the Massachusetts Institute of Technology's Washington, DC Office since January 2006, reporting to MIT's President. At MIT, he works to support the Institute's strong and historic relations with federal R&D agencies, and its role on national science policy. He has assisted with major MIT technology policy initiatives, on energy technology, the "convergence" of life, engineering and physical sciences, advanced manufacturing and most recently online higher education. Prior to MIT, he served for seventeen years as a senior policy advisor in the U.S. Senate. His legislative efforts included science and technology policy and innovation issues. He worked extensively on legislation creating the Department of Homeland Security, on Intelligence reform, on climate change, on defense and life science R&D, and on national competitiveness and innovation legislation leading to the *America Competes Act* in 2007.

He is on the adjunct faculty at Georgetown University and Johns Hopkins SAIS, and has taught courses in science and technology policy at Georgetown, Hopkins, MIT, and George Washington University.

His new book, with Distinguished Prof. Charles Weiss of Georgetown, entitled *Technological Innovation in Legacy Sectors*, concerns the challenge of innovating in legacy economic sectors, was published in the fall of 2015 by Oxford University Press. His book, (with Prof. Weiss), *Structuring an Energy Technology Revolution,* was published by MIT Press in 2009.

Prior to his work on the Senate, he was a partner at a large national law firm. Early in his career, he served as the Deputy Assistant Secretary and Director of Congressional Affairs at the U.S. Department of Transportation, working on major transportation deregulation legislation. He received a B.A. from Columbia University with honors, an M.A.R. from Yale Divinity School in religion; and a J.D. from Columbia Law School, where he also served on the Board of Editors of the *Columbia Law Review*. Following law school, he served as a law clerk to Hon. Jack Weinstein, a Federal Judge in New York. He has been a member of the Connecticut Bar, the District of Columbia Bar and the U.S. Supreme Court Bar.

Barry Bozeman

Barry Bozeman is Arizona Centennial Professor of Public Management and Technology Policy and Director of the Center of Organizational Research and Design. Previous positions include Regents' Professor and Ander Crenshaw Endowed Chair of Public Policy, University of Georgia; Regents' Professor of Public Policy at Georgia Tech and Professor of Public Administration, Law and Affiliate Professor of Engineering at Syracuse University where he was founding director of the Maxwell School's founding director of the Center for Technology and Information Policy. Bozeman has had visiting appointments at University of Michigan, Columbia University, University of Copenhagen, and Universite Marne-La-Valle (Paris Est).

Bozeman's research focuses on public management, organization theory and science and technology policy. He is the author or editor of sixteen books, including most recently, *Rules and Red Tape: A Prism for Public Administration Theory Development* (Sharpe Publishing, 2011) and *Public Values and Public Interest* (Georgetown University Press, 2007). The latter book won the American Political Science Association's Herbert Simon Award for best book published in public administration and public affairs. Bozeman's *All Organizations Are Public* (Jossey-Bass, 1987) helped establish a new research and theory approach to "publicness."

Professor Bozeman's research articles have appeared in every major U.S. journal in the fields of public policy and public management, as well as such diverse journals as *American Journal of Political Science, IEEE Transactions in Engineering Management, Research Policy, Economics of Education, American* Journal of Public Health, *Social Studies of Science, Managerial and Decision Economics*, and *Human Relations.* On many occasions, his research has been summarized in science publications, such as *Nature, Nature Medicine, Science,* and *Issues in Science and Technology* and mass media, including, *Wall Street Journal,*

New York Times, The Economist, Chronicle of Higher Education, and *The Philadelphia Inquir-er.*

Bozeman's practitioner experience includes a position at the National Science Foundation's Division of Information Technology and a visiting position at the Science and Technology Agency's (Japan) National Institute of Science and Technology Policy. Bozeman has served as a consultant to a variety of federal and state agencies in the United States, including the Internal Revenue Service, the Department of Commerce, the National Science Foundation and the Department of Energy. He has helped in the design and evaluation of the national innovation systems of the Republic of South Africa, Canada, New Zealand, France, Israel, Chile, and Argentina. He is a member of the scientific council of the Institut Francilien Recherche, Innovation et Société (France).

Bozeman's research has been supported by the National Science Foundation, National Institutes of Health, Department of Energy, the Environmental Protection Agency, NIST, Rockefeller Foundation, Kellogg Foundation, and Sloan Foundation. He is an elected fellow of both the American Association for the Advancement Science and the National Academy of Public Administration. Awards received include the Charles Levine Memorial Award of the American Society for Public Administration and the National Association of Schools of Public Affairs and Administration. Bozeman received the 2013 Public Management Research Association's H. George Frederickson Award for "lifetime achievement and contributions to public management research.

Michael Calabrese

Michael Calabrese is director of the Wireless Future Project, which is part of New America's Open Technology Institute. He also serves as a senior research fellow affiliated with the Asset Building Program. Mr. Calabrese focuses on developing policies that promote pervasive connectivity, including spectrum policy reform, mobile market competition, wireless broadband deployment and IT investment and innovation more broadly.

Mr. Calabrese currently serves as an appointed member of the U.S. Department of Commerce Spectrum Management Advisory Committee (CSMAC) since 2009. He also served as an invited expert on the President's Council of Advisors on Science and Technology (PCAST) spectrum reform working group during 2011-2012.

Mr. Calabrese also served as vice president (2003-2010) and was instrumental in establishing the organization's programs in areas including retirement security, health policy, asset building, education and the Next Social Contract Initiative.

Previously, Mr. Calabrese served as general counsel of the Congressional Joint Economic Committee, as director of Domestic Policy Programs at the Center for National Policy, and as pension and employee benefits counsel at the national AFL-CIO.

As an attorney and graduate of both Stanford Business and Law Schools, Mr. Calabrese speaks and writes frequently on issues related to spectrum, wireless broadband, and Internet policy, as well as on pension policy and retirement security. He has co-authored three

books and published opinion articles in *The New York Times*, *The Washington Post*, *The Atlantic Monthly*, *Slate*, and other leading outlets.

Erin Cadwalader

Erin Cadwalader leverages her biological research expertise and experience in government relations to offer Lewis-Burke clients unique insight on how to most effectively advance their research objectives in the areas of biomedical research, neurobiology, and social science. Dr. Cadwalader monitors and analyzes congressional legislation, public policy activities, and federal funding opportunities to formulate effective advocacy strategies and tactical legislative planning. Prior to joining Lewis-Burke, Dr. Cadwalader was the public policy fellow at the Association for Women in Science (AWIS), where she developed and implemented advocacy strategies for positive system transformation to address the gender gap in the STEM (science, technology, engineering, and mathematics) pipeline. In this role, she worked closely with various stakeholders and coalitions, including policy makers, government agencies, academics, and other non-profits to raise awareness, identify new solutions, and implement change. Dr. Cadwalader began her advocacy career worked as a science policy fellow at Research!America. In this capacity, she worked to urge support for biomedical research, disseminating complex scientific research to the general public and communicating critical policy to members of Congress. Dr. Cadwalader also served as a health policy advocate for the Utah Health Policy Project, analyzing proposed legislation regarding S-CHIP and disparities in health outcomes for various populations. Dr. Cadwalader's career in academia boasts over a decade of laboratory research in developmental biology. During her graduate studies at the University of Utah, her research focused on how cells communicate information to one another in early zebrafish development. As an undergraduate at the University of Wisconsin-Madison, Erin studied the differentiation in human embryonic stem cells, earning a B.S. in biochemistry. Dr. Cadwalader holds a Ph.D. in neurobiology and anatomy. She currently serves as an advisory board member on the Association of Public and Land-Grant Universities (APLU) Commission on Innovation, Competitiveness, and Economic Prosperity (CICEP).

Robert Cook-Deegan

Robert Cook-Deegan (aka BCD) is a research professor in the Sanford School of Public Policy, Duke University, with secondary appointments in Internal Medicine (School of Medicine), and Biology (Trinity College of Arts & Sciences). In Fall 2015, he was a visiting professor at Arizona State University, with an eye to joining its new School for the Future of Innovation in Society in summer 2016. He was the founding director of the Center for Genome Ethics, Law & Policy in Duke's Institute for Genome Sciences & Policy from July 2002 through December 2012. He is the author of *The Gene Wars: Science, Politics, and the Human Genome* and an author on over 250 articles.

Jason Day

Jason Day has served for the past two years as the Legislative Director for Congressman Daniel Lipinski. Jason serves as the principal advisor for the Congressman in his duties as Ranking Member of the Research and Technology Subcommittee of the House Science Committee, and has crafted legislation on the commercialization of research results, advanced manufacturing, cybersecurity research, transportation R&D, and the regulation of

research activities at universities. Before joining the Congressman's office four years ago, Jason held fellowships in the Office of Senator Al Franken and at the National Science Foundation. Jason has a Ph.D. in Atomic Physics from the University of Wisconsin-Madison.

Maryann Feldman

Maryann P. Feldman is the Heninger Distinguished Professor in the Department of Public Policy at the University of North Carolina. Her research and teaching interests focus on the areas of innovation, the commercialization of academic research and the factors that promote technological change and economic growth. She is currently Program Director at the National Science Foundation for the Science of Science and Innovation Policy program.

She is author of *Geographies of Innovation* that examines the spatial distribution of industrial innovation and provides an empirical model of the factors and resources that affected the production of new product innovation. This work revealed that universities were necessary but not sufficient for technology-based economic development, which launched a new area of investigation into university technology transfer.

Feldman has also explored emerging industries, entrepreneurship and the process of regional transformation. This was the topic of the edited book, *Cluster Genesis: the origins of technology-based economic development*. She has written extensively on the early development and growth of biotechnology, as an example of a transformative technology. While at the Rotman School of Management at the University of Toronto, Feldman examined Jurisdictional Advantage or how places construct unique, not easily replicated economic advantage; this work was published in The Brookings Papers on Economic Policy and Research Policy.

Virginia Eubanks

Virginia Eubanks is the cofounder of Our Knowledge, Our Power (OKOP), a grassroots anti-poverty and welfare rights organization, and the Popular Technology Workshops, which help community organizations and social movements make the connection between technology and their other social justice goals. She teaches in the Department of Women's Studies at the University at Albany, SUNY, and writes books about technology, social justice, and politics. In past lives, she edited the cyberfeminist 'zine *Brillo* and was active in the community technology center movements in the San Francisco Bay Area and Troy, NY.

Eubanks draws people into her experiences with insight and enthusiasm, sharing what she's learned and what she thinks we should do to help technology serve liberation. She gears her talks to hit audiences "where they're at," and has appeared in dozens of bookstores, universities, festivals, and community contexts. She is comfortable discussing her work, training social movement leaders, and facilitating workshops on technology and social change.

Susan Fitzpatrick

Beginning January 2015, Susan M. Fitzpatrick was appointed president of the James S. McDonnell Foundation, St. Louis, Missouri. The McDonnell Foundation is one of a limited number of international grant-makers supporting university-based research in the biologi-

cal and behavioral sciences through foundation-initiated programs via competitive, peer-review proposal processes. As President, Fitzpatrick serves as JSMF's Chief Operating Officer.

Fitzpatrick received her Ph.D. in Biochemistry and Neurology from Cornell University Medical College (1984) and pursued post-doctoral training with in vivo NMR spectroscopic studies of brain metabolism in the Department of Molecular Biochemistry and Biophysics at Yale University.

Fitzpatrick served as the Associate Executive Director of the Miami Project to Cure Paralysis (1989-1992), a comprehensive basic science and applied science research center focused on restoring neurological function to persons with spinal cord injury. Her responsibilities included all public outreach and educational efforts and she served as the scientific liaison to the development, fundraising, and public relations staff. As Executive Director of the Brain Trauma Foundation (1992-1993), Fitzpatrick guided the Foundation through a re-organization. BTF is now a leader in advancing the acute care of patients with traumatic brain injury. Fitzpatrick joined the James S. McDonnell Foundation in 1993 as the Foundation's first Program Officer. She was promoted to Program Director in 1997 and to Vice President in 2000. Fitzpatrick is an adjunct associate professor of Neurobiology and Anatomy and Occupational Therapy at Washington University School of Medicine (St. Louis), teaching neuroscience. Fitzpatrick lectures and writes on issues concerning applications of neuroscience to clinical problems, the role of private philanthropy in the support of scientific research, and on issues related to the public dissemination of and understanding of science. Fitzpatrick serves on the boards of the Association for Women in Science, the Ontario Brain Institute, the American Occupational Therapy Foundation, and she is a past member of the board of the American Association for the Advancement of Science.

William Galston

William A. Galston holds the Ezra K. Zilkha Chair in the Brookings Institution's Governance Studies Program, where he serves as a senior fellow. A former policy advisor to President Clinton and presidential candidates, Galston is an expert on domestic policy, political campaigns, and elections. His current research focuses on designing a new social contract and the implications of political polarization.

He is also College Park Professor at the University of Maryland. Prior to January 2006, he was Saul Stern Professor and Acting Dean at the School of Public Policy, University of Maryland, director of the Institute for Philosophy and Public Policy, founding director of the Center for Information and Research on Civic Learning and Engagement (CIRCLE), and executive director of the National Commission on Civic Renewal, co-chaired by William Bennett and Sam Nunn. A participant in six presidential campaigns, he served from 1993 to 1995 as Deputy Assistant to President Clinton for Domestic Policy. From 1969 to 1970 Galston served as a member of the United States Marine Corps and was honorably discharged.

Galston is the author of eight books and more than 100 articles in the fields of political theory, public policy, and American politics. His most recent books are *Liberal Plural-*

ism (Cambridge, 2002), *The Practice of Liberal Pluralism* (Cambridge, 2004), and *Public Matters* (Rowman & Littlefield, 2005). A winner of the American Political Science Association's Hubert H. Humphrey Award, he was elected a Fellow of the American Academy of Arts and Sciences in 2004.

Galston has appeared on all the principal television networks and is a frequent commentator on NPR. He writes a weekly column for the *Wall Street Journal*.

Monica Gaughan

Monica Gaughan is Associate Professor in the School of Human Evolution and Social Change at Arizona State University.

Professor Gaughan vita in her own words: "I grew up in Connecticut, raised by a father who was a college textbook editor and a mother who made more money cleaning houses than she could in any other pink collar job. I went to the New College of Florida where I earned a BA (1989) in Political Science; my honors thesis was on whistleblowing about organizational wrongdoing. After working for a couple of years at a community mental health clinic, I earned a Master of Public Administration degree from the Maxwell School, Syracuse University (1992); one of my criteria in choosing the program was that I would not have to write another thesis. After working a couple of more years as a Presidential Management Fellow at the U.S. Department of Health and Human Services, I earned a MA (1997) and Ph.D. (1999) in Sociology from the University of North Carolina at Chapel Hill. My master's thesis examined determinants of American women's marital timing, and my dissertation demonstrated gender differences in peer effects on adolescent binge drinking. I have held academic appointments at Oglethorpe University (1999-2001), Georgia Institute of Technology (2002-2006), and the University of Georgia (2006-2013). I love to travel near and far, have too many pets, and consider no day complete without reading fiction."

David Goldston

David Goldston is director of government affairs for NRDC in Washington, DC and is responsible for its governmental strategies, bringing together NRDC's interactions with Congress, the administration and the public. He has more than twenty years of experience on Capitol Hill, working mainly on science and environmental policy and served as chief of staff of the House Committee on Science from 2001 through 2006. He has been a visiting lecturer at Princeton and Harvard Universities and a columnist for the journal *Nature*. In 2008 and 2009, he was project director for the Bipartisan Policy Center report, "Improving the Use of Science in Regulatory Policy" and he has served on several panels at the National Academy of Sciences. David graduated from Cornell University in 1978 with a B.A. in history and completed the course work for a Ph.D. in American history at the University of Pennsylvania.

David Hart

David M. Hart is Professor and Director of the Center for Science and Technology Policy at the School of Policy, Government, and International Affairs (SPGIA) at George Mason University. Professor Hart served as Senior Associate Dean of SPGIA from May 2013 to June 2015. He served as assistant director for innovation policy, with a focus on advanced manu-

facturing, at the Office of Science and Technology Policy, Executive Office of the President, from July 2011 to August 2012. Hart's recent academic work focuses high-growth entrepreneurship, high-skill migration, and energy innovation. His books include *Unlocking Energy Innovation* (MIT Press, co-authored with Richard K. Lester), *The Emergence of Entrepreneurship Policy* (Cambridge University Press), and *Forged Consensus: Science, Technology, and Economic Policy in the U.S., 1929-1953* (Princeton University Press). Prof. Hart is as a non-resident senior fellow in the Metropolitan Policy Program at the Brookings Institution and a member of the board of the Information Technology and Innovation Foundation.

Susan Hennessey

Susan Hennessey is Fellow in National Security in Governance Studies at the Brookings Institution. She is the Managing Editor of the Lawfare blog, which is devoted to sober and serious discussion of "Hard National Security Choices." She focuses on national security issues surrounding cybersecurity, surveillance, federal terrorism prosecutions, and congressional oversight of the intelligence community.

Prior to joining Brookings, Ms. Hennessey was an attorney in the Office of General Counsel of the National Security Agency. At the NSA, she advised operational elements on matters relating to Information Assurance and Cybersecurity and represented the Agency on cybersecurity legislation and related executive actions.

Hennessey received her J.D. from Harvard Law School and B.A. in Italian from the University of California, Los Angeles.

Mike Holland

Mike serves as the Executive Director of New York University's Center for Urban Science and Progress, a data science program focused understanding and improving the quality of life in cities. Prior to coming to NYU, Mike spent 13 years in Washington, DC overseeing federal R&D programs, most recently as the Senior Advisor and Staff Director in the Office of the Under Secretary for Science at the U.S. Department of Energy. He was the program examiner in the White House Office of Management & Budget with responsibility for the Department of Energy's Office of Science, Advanced Research Projects Agency-Energy (ARPA-E), and Cerro Grande fire recovery activities. Mike has also served as a senior policy advisor in the White House Office of Science & Technology Policy and on the staff of the U.S. House of Representative's Committee on Science. Mike earned his Ph.D. in analytical chemistry from the University of North Carolina at Chapel Hill.

Colin Macilwain

Colin Macilwain is currently editor of the science policy newsletter *Research Europe*, and associate editor of its sister publication, *Research Fortnight*. He is also a columnist for *Nature*, and writes news and commentary on global research policy for *Science*, *Cell*, and other publications. He trained as an engineer, and has extensive experience in writing and editing on technology, business, science and research policy, including twelve years in Washington, DC as senior correspondent, and then news editor, at *Nature*.

Mark Muro

Mark Muro is a fellow and the director of policy for the Brookings Institution's Metropolitan Policy Program, and research director (Washington, DC) of the Brookings Mountain West Initiative. At Brookings, Mark manages the program's public policy analysis and leads key policy research projects. Muro managed and co-wrote with Robert Lang the landmark study "Mountain Megas: America's Newest Metropolitan Places." He is also the author of "MetroPolicy: Shaping a New Federal Partnership for a Metropolitan Nation" and two major reports on the federal stimulus program: "Metro Potential in ARRA: An Early Assessment of the American Recovery and Reinvestment" and, most recently, "Implementing ARRA: Innovations in Design in Metropolitan America." These reports represent key elements of the metro program's Blueprint for American Prosperity initiative, an ambitious multi-year project to build long-term U.S. prosperity by revitalizing the federal relationship with metropolitan areas.

Muro is also the author of recent publications including "Reconnecting Massachusetts' Gateway Cities: Lessons Learned and an Agenda for Renewal," "Charting Maine's Future: An Action Plan for Promoting Sustainable Prosperity and a Sustainable Future," and "Back to Prosperity: A Competitive Agenda for Renewing Pennsylvania."

Prior to joining Brookings, Muro was a senior policy analyst at the Morrison Institute for Public Policy at Arizona State University. He was also a staff writer for The Boston Globe and an editorial writer for The Arizona Daily Star. Muro is a member of the Citistates Group, a network of journalists, speakers, and civic leaders focused on building competitive, equitable, and sustainable 21st century metropolitan regions. He holds a bachelor's degree from Harvard College and a master's degree in American studies from the University of California, Berkeley.

Shobita Parthasarathy

Shobita Parthasarathy is Associate Professor of Public Policy and Women's Studies at the University of Michigan. She studies policy and politics related to science and technology, as well as the politics of evidence and expertise in policymaking, in the United States, Europe, and India. She is the author of numerous articles and a book, *Building Genetic Medicine: Breast Cancer, Technology, and the Comparative Politics of Health Care* (MIT Press, 2007). Findings from this book, which compared the development of genetic testing for breast and ovarian cancer in the United States and Britain, helped to inform the 2013 U.S. Supreme Court case over gene patents. Her second book, *Patently Political: Life, Markets, and Morality in the United States and Europe,* is forthcoming with University of Chicago Press. Comparing recent controversies over life form patents in the United States and Europe, it demonstrates how political culture, ideology, and history shape patent systems in fundamental ways. She is starting a new project which aims to develop a better understanding of grassroots innovation in India, which often takes place outside the global marketplace and is low-tech and small-scale, in the hope that it might usefully inform both our theories of innovation and our innovation and development policies. She is a Faculty Affiliate in UM's Science, Technology, and Society and Feminist Science Studies programs. She sits on the Council of the Society for the Social Studies of Science, and the Governing Council of the Science and Democracy Network.

To support her research, Prof. Parthasarathy has received fellowships and grants from the Woodrow Wilson International Center for Scholars, the American Council of Learned Societies, the Max Planck Institute for Intellectual Property, Competition, and Tax Law (Germany), the American Bar Foundation, the Wellcome Trust (UK), the National Science Foundation, and various programs at the University of Michigan.

Prof. Parthasarathy is committed to bringing academic insights into practice and policy. In this spirit, she teaches graduate and undergraduate students across a wide variety of fields, including public policy, the natural and physical sciences, and engineering. She has written for The New York Times, Nature, and The Conversation, and has been interviewed by PBS, The New Scientist, the San Diego Union Tribune, and German ARD Radio among other outlets. She has advised the American Civil Liberties Union; U.S. Government Accountability Office; European Patent Office; Dutch Medical Biotechnology Commission; Secretary's Advisory Committee on Genetics, Health, and Society (U.S. Department of Health and Human Services); Austrian Genome Research Programme; Policy Committee of the University of Michigan's Consortium for Stem Cell Therapies; and individual members of the U.S. Congress. And she sits on the Board of Directors of Breast Cancer Action, a health justice advocacy group.

Elizabeth Popp-Berman

Elizabeth is an associate professor of sociology at the University at Albany, SUNY, working at the intersection of economic sociology, the sociology of knowledge, and science & technology studies. She received her Ph.D. in Sociology from Berkeley in 2007. In 2013-14, she was the Richard B. Fisher Member of the Institute for Advanced Study in Princeton. Most of her work focuses on recent U.S. history (1960s to 1980s) and emphasizes the role of public policy.

Her main current project is a book, *Thinking Like an Economist: How Economics Became the Language of U.S. Public Policy*, under contract with Princeton University Press. Her first book, *Creating the Market University: How Academic Science Became an Economic Engine*, was published in 2012, also by Princeton University Press. It received the President's Book Award from the Social Science History Association, and the Max Weber Award for Distinguished Scholarship and the Pierre Bourdieu Award from the American Sociological Association.

She is also in the early phases of a project on the history of student loan policy.

Arti Rai

Arti Rai, Elvin R. Latty Professor of Law and co-Director, Duke Law Center for Innovation Policy, is an internationally recognized expert in intellectual property (IP) law, administrative law, and health policy. Rai has also taught at Harvard, Yale, and the University of Pennsylvania law schools. Rai's research on IP law and policy in biotechnology, pharmaceuticals, and software has been funded by NIH, the Kauffman Foundation, and the Woodrow Wilson Center. She has published over 50 articles, essays, and book chapters on IP law, administrative law, and health policy. Her publications have appeared in both peer-reviewed journals and law reviews, including Science, the New England Journal of Medicine, the Journal of Le-

gal Studies, Nature Biotechnology, and the Columbia, Georgetown, and Northwestern law reviews. She is the editor of *Intellectual Property Law and Biotechnology: Critical Concepts* (Edward Elgar, 2011) and the co-author of a 2012 Kauffman Foundation monograph on cost-effective health care innovation.

From 2009-2010, Rai served as the Administrator of the Office of External Affairs at the U.S. Patent and Trademark Office (USPTO). As External Affairs Administrator, Rai led policy analysis of the patent reform legislation that ultimately became the America Invents Act and worked to establish the USPTO's Office of the Chief Economist. Prior to that time, she had served on President-Elect Obama's transition team reviewing the USPTO. Prior to entering academia, Rai clerked for the Honorable Marilyn Hall Patel of the U.S. District Court for the Northern District of California; was a litigation associate at Jenner & Block (doing patent litigation as well as other litigation); and was a litigator at the Federal Programs Branch of the U.S. Department of Justice's Civil Division.

Rai regularly testifies before Congress and relevant administrative bodies on IP law and policy issues and regularly advises federal agencies on IP policy issues raised by the research that they fund. She is a member of the National Advisory Council for Human Genome Research and of an Expert Advisory Council to the Defense Advanced Projects Research Agency (DARPA). Rai is a public member of the Administrative Conference of the United States, a member of the American Law Institute, and co-chair of the IP Committee of the Administrative Law Section of the ABA. Rai is currently a member of the Institute of Medicine Committee on Strategies for Responsible Sharing of Clinical Trial Data and has served on, or as a reviewer for, numerous National Academies of Science committees. In 2011, Rai won the World Technology Network Award for Law.

Rai graduated from Harvard College, *magna cum laude*, with a degree in biochemistry and history (history and science), attended Harvard Medical School for the 1987-1988 academic year, and received her J.D., *cum laude*, from Harvard Law School in 1991. Rai's moot court team at Harvard Law School won Best Brief and Team honors at the school's prestigious Ames Moot Court Competition.

Beth Robinson

Dr. Elizabeth "Beth" Robinson is director of Finance and chief financial officer (CFO) of the Air Line Pilots Association, International (ALPA) since November 2014. Between 2009 and 2014 she was Chief Financial Officer for the National Aeronautics and Space Administration. She was responsible for the financial health of the agency, including responsibility for ensuring that NASA resources are effectively employed toward the achievement of NASA's strategic plan. She managed the organization's budget and financial operations, directed the preparation and submission of annual financial and budgetary reports, and coordinated agency financial management activities with other federal agencies.

Prior to joining NASA, Robinson was the senior-most Office of Management and Budget career official, responsible for supporting the OMB Director in developing, publishing, and enacting the President's Budget request. As Assistant Director for Budget, she provided leadership in the preparation of budget proposals, database and documents; development

and review of budget estimates; and development of budget procedures and budget ac-counting concepts.

Before becoming Assistant Director for Budget in September, 2005, Robinson served as the Deputy Director for the Congressional Budget Office, where she assisted the Director in the overall management of the organization and represented CBO on the Federal Accounting Standards Advisory Board.

Previously, Robinson served as OMB's Deputy Assistant Director for Budget Review and Concepts. Her primary responsibilities included overseeing the development of the Presi-dent's discretionary budget request and associated budget documents; revisions to agency guidance and congressional scoring rules; issues arising in the execution of the budget; proposals for and Congressional action on appropriation bills; and policy analysis projects.

Prior to joining OMB's Budget Review Division, she worked as the OMB program examiner for energy issues, including the defense, intelligence, fossil energy, and science programs at the Department of Energy. From 1994 to 1998, she was a staff member on the Committee on Science in the House of Representatives. From 1989 to 1994, Robinson worked at the Congress's Office of Technology Assessment. Before that, she was an assistant professor of geophysics at Stanford University, having graduated from MIT with a Ph.D. in geophysics in 1987. She holds an undergraduate degree in physics from Reed College.

Bhaven Sampat

Associate Professor in the Department of Health Policy and Management at Columbia Uni-versity, an affiliated faculty member at Columbia Law School, and a Research Associate at the National Bureau of Economic Research. He received his B.A., M.A., M.Phil., and Ph.D. (all in economics) from Columbia.

Most of Prof. Sampat research focuses on issues at the intersection of health policy and in-novation policy. For example, he is currently examining the implementation of pharmaceu-tical patent laws in developing countries, the effects of upstream patents on downstream innovation and commercialization, the roles of the public and private sectors in drug de-velopment, and the returns to different types of medical research.

His previous work includes research on U.S. drug patent policy, the political economy of the the NIH, patent examination and patent quality, measuring innovation, and the role of pa-tents in university-industry technology transfer.

During the 2015-16 academic year, Sampat will be on sabbatical leave as a Visiting Profes-sor at the Robert F. Wagner Graduate School of Public Service at NYU, and as a Distin-guished Scholar in Residence at the Engelberg Center on Innovation Law and Policy at the NYU School of Law.

Daniel Sarewitz

Daniel Sarewitz's work focuses on revealing the connections between science policy deci-sions, scientific research and social outcomes. How does the distribution of the social bene-

fits of science relate to the way that we organize scientific inquiry? What accounts for the highly uneven advance of know-how related to solving human problems? How do the interactions between scientific uncertainty and human values influence decision making? How does technological innovation influence politics? And how can improved insight into such questions contribute to improved real-world practice?

From 1989 to 1993, Sarewitz worked on R&D policy issues as a staff member in the U.S. House of Representatives, and principal speechwriter for Committee Chairman George E. Brown, Jr. He received a doctorate in geological sciences from Cornell University in 1986. He now directs CSPO's office in Washington, DC, and focuses his efforts on a range of activities to increase CSPO's impact on federal science and technology policy processes.

Sarewitz's most recent book is *The Techno-Human Condition* (MIT Press, 2011; co-authored with Braden Allenby). Since 2009 he has also been a regular columnist for Nature magazine. Other published work includes *Frontiers of Illusion: Science, Technology, and the Politics of Progress* (Temple University Press, 1996), *Living with the Genie: Essays on Technology and the Quest for Human Mastery* (Island Press, 2003; co-edited with Alan Lightman and Christina Desser) and *Prediction: Science, Decision-Making, and the Future of Nature* (Island Press, 2000; co-edited with Roger Pielke, Jr., and Radford Byerly, Jr.). Visit the CSPO online library (www.cspo.org) for more.

Tania Simoncelli

Tania Simoncelli is Senior Advisor to the Director of the Broad Institute of MIT and Harvard. Prior to coming to the Broad, she served for two years as Assistant Director for Forensic Science and Biomedical Innovation in the White House Office of Science and Technology Policy (OSTP), where she led several multi-agency initiatives to strengthen the forensic sciences and played a lead role in developing and launching the President's Precision Medicine Initiative. From 2010–2013, Simoncelli served as Senior Advisor in the Office of the Commissioner of the U.S. Food and Drug Administration, where she provided guidance on a range of issues, including nutrition labeling, food safety, scientific integrity, genetic testing, and personalized medicine. From 2003–2010, Simoncelli worked as the first Science Advisor to the American Civil Liberties Union (ACLU), where she guided the organization's responses to cutting-edge developments in science and technology and spearheaded the ACLU's successful Supreme Court challenge to the patenting human genes. In 2013, Simoncelli was named by the journal *Nature* as one of "ten people who mattered this year" for her work in overturning gene patents. Simoncelli holds a B.A. in Biology & Society from Cornell University and an M.S. in Energy and Resources from the University of California, Berkeley.

Tom Stossel

Thomas P. Stossel, M.D. is Director of the Translational Medicine Division and Senior Physician in Hematology at Brigham & Women's Hospital, Harvard Medical School. He is also a visiting scholar at the American Enterprise Institute, where he researches and writes about health care policy, the interface between medicine and industry, and medical innovation and research funding

Lauded for his trailblazing work on the mechanisms of how cells move about the body, Stossel has been elected to the National Academy of Sciences, the American Academy of Arts and Sciences, and the Institute of Medicine. He is also the recipient of many awards and honorary degrees. He has been president of the American Society for Clinical Investigation and of the American Society of Hematology, as well as editor in chief of the Journal of Clinical Investigation. He serves as an honorary physician at the University Teaching Hospital and a guest lecturer at the Dental Training School, both in Lusaka, Zambia.

Stossel is the author of more than 291 publications, including two textbooks, and has received patents for 12 inventions. A former scientific adviser to Biogen Idec and Dyax Corp, he is the founding scientist of BioAegis Therapeutics Inc. and a director of Velico Medical Inc. — two companies undertaking the clinical development of his discoveries dealing with blood transfusion and the control of inflammation.

Stossel obtained his medical degree from Harvard Medical School and his undergraduate degree from Princeton University, where he studied English literature. He did his internship and residency at Massachusetts General Hospital and studied in the Metabolism Section of the Molecular Disease Branch at the National Heart Institute. He later studied hematology as a fellow in pediatrics at Boston Children's Hospital and as a fellow in medicine at Peter Bent Brigham Hospital.

Mark Zachary Taylor

Dr. Mark Zachary Taylor, formerly a solid-state physicist, now specializes in international relations, political economy, and comparative politics. In his research, he seeks to explain why some countries are better than others at science and technology. Prof. Taylor's research interests also include science and technology policy, comparative democratic institutions, the presidency and the politics of economic growth. His research has been published the in the journals Foreign Affairs, International Organization, Security Studies, Journal of Business Venturing, Review of Policy Research, Harvard International Review, Journal of Health Politics, Policy and Law, and the Journal of Political Science Education. Dr. Taylor holds a Ph.D. in Political Science from MIT, an MA in International Relations from Yale University, earned a BA in Physics from UC Berkeley, and has attended university in Japan.

Walter Valdivia

Walter D. Valdivia is a non-resident fellow in the Center for Technology Innovation at Brookings. He studies science, technology, and innovation policy.

Valdivia's published work includes studies of university patenting and the Bayh-Dole regime, the politics of federal R&D, innovation in manufacturing, responsible innovation, and academic freedom and export controls. His current research examines university technology transfer, innovation and inequality, and the governance of responsible innovation with attention to emerging technologies.

Valdivia holds a B.S. in economics from Universidad Católica Boliviana, and an M.S. in economics and a Ph.D. in public administration from Arizona State University.

Philip Wallach

Philip Wallach is a senior fellow in Governance Studies at the Brookings Institution. He writes on a wide variety of domestic policy topics, including climate change, regulatory reform, the debt ceiling, and marijuana legalization. He is the author of *To the Edge: Legality, Legitimacy, and the Responses to the 2008 Financial Crisis* (2015).

He is considered an expert on the Clean Power Plan, interbranch relations, legal and political aspects of monetary policy, the Glass-Steagall Act, and regulatory capture.

His writing has been featured in *The Washington Post*, *Newsweek*, *U.S. News & World Report*, *National Review*, *The Hill*, and *Roll Call*, *National Affairs*, and *The New Rambler Review*, as well as in scholarly journals including *Studies in American Political Development*, and he has been quoted in a variety of publications including the *Financial Times* and *Wall Street Journal*.

His current projects include examining the legitimacy challenge faced by America's administrative state, considering the interest group politics of marijuana legalization, and working out the contours of a Congressional Regulation Office.

Wallach received a B.A. from the College of Social Studies at Wesleyan University and a Ph.D. in Politics from Princeton University.

David Winickoff

Prof. Winickoff is Director of the Berkeley Program in Science & Technology Studies and serves on the Governing Council of the Science and Democracy Network. He is also a former Greenwall Faculty Scholar in Bioethics.

Winickoff analyzes the role of science and expertise in environmental law and politics, and explore biotechnology and medicine from an ethical, legal and social perspective. He writes about questions of biological resources, property rights, and the commons; the role of expert communities in governing institutions; the politics of risk assessment; food safety standards; climate change and geoengineering. To do this, Winickoff draws questions and methods primarily from the fields of science and technology studies (STS), bioethics, and law. He is involved in policy work at state, federal, and international levels.