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The Role of the President in STI Policy-Making in the United States

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The President of the United States is widely considered to be the most powerful person in the world. Yet even the president is subject to the “checks and balances” that characterize the U.S. political system. Constraints on the president’s power are as evident in the sphere of science, technology, and innovation (STI) policy as in any other. Fragmented authority across institutions requires the president to seek and coordinate with allies, to rely on persuasion more than coercion, and to sustain these efforts for a long time across many venues to achieve S&T goals. I illustrate this argument briefly by reference to President Obama’s advanced manufacturing policy.

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The President of the United States is widely considered to be the most powerful person in the world, and rightly so. The president can order the application of overwhelming lethal force on short order to nearly any point on the planet. The president, as we have recently learned, can acquire the contents of nearly any private electronic communication. The president can panic global financial markets with an ill-chosen phrase.

And yet, for all that, the president is far from omnipotent. The president cannot spend a dollar without the imprimatur of the legislative branch. The president's legal authority is limited by the Constitutional rights of private citizens and state governments as well as by the other branches of the federal government. Even the president's role as commander-in-chief of the U.S. armed forces is subject to the "checks and balances" that characterize the U.S. political system.

Constraints on the president's power are as evident in the sphere of science, technology, and innovation (STI) policy as in any other sphere. Authority is fragmented along many dimensions, requiring the president to seek and coordinate with allies, to rely on persuasion more than coercion, and to sustain these efforts for a long time across many venues if he (or, perhaps in the future, she) wants to achieve his or her goals. I illustrate this argument briefly by reference to President Obama's advanced manufacturing policy.

FRAGMENTATION IS THE KEY CHARACTERISTIC OF THE U.S. SYSTEM

Presidential scholar Richard E. Neustadt in 1960 famously described the U.S. political system as "separated institutions sharing power."¹ If any player in this system, including the president, wants to orient the awesome scientific and technological capabilities of the United States toward a particular end, such as fighting the

"global war on terror," curing cancer, or limiting global climate change, this player must overcome institutional fragmentation along many dimensions:

1. Sectoral fragmentation. The United States is a preeminently liberal society, in which private property and individual autonomy are often jealously guarded from the intrusions of the public sector. Private businesses and universities are responsible for most STI activity. For instance, approximately 70 percent of all research and development (R&D) funding in the United States is provided by the private sector.²

2. Vertical fragmentation. Under the U.S. Constitution, all powers not specifically delegated to the federal government are reserved to the state governments. States are active in many areas of STI policy. For example, nearly all states have articulated economic development strategies based on nurturing technological innovation and high-tech entrepreneurship.³

3. Horizontal fragmentation. The doctrine of the separation of powers gives the major organs of the federal government the ability to overrule one another under specific circumstances. The president may propose measures for taxing and spending in order to shape STI activity, for example, but Congress must approve them. In recent years, many of President Obama's STI proposals, such as his plan for federal investments in the development and deployment of low-carbon energy innovations, have been the subject of intense struggles between the executive and legislative branches.⁴

4. Temporal fragmentation. The U.S. government lacks the institutional memory that is provided by a strong civil service or political party hierarchies.⁵ The president typically comes to office without experience in STI policy and must assemble a team in this domain from scratch upon win-

ning election. Key STI policy positions in the executive branch may be subject to frequent turnover, including long periods in which they are occupied by "acting" officials who are awaiting legislative confirmation or replacement, which limits their power.

5. Internal fragmentation. U.S. policy-making institutions are fragmented internally, too. In Congress, for instance, one set of committees determines how the federal government will spend its R&D budget, while another set tackles the very similar task of deciding which private R&D activities will be exempt from federal taxation. More complex policy-making activities, such as those that influence whether medical innovations are made and diffused, involve an even wider array of policy actors.

FRAGMENTATION CHARACTERIZES THE WHITE HOUSE AS WELL

The internal fragmentation of Congress finds something of a mirror image within the executive branch and, more particularly, within the White House. In order to operate with a modicum of effectiveness in a fragmented institutional environment, and in a world facing problems of mounting complexity, the president has had to develop highly specialized units for policy formulation and execution.⁶ The Office of Science and Technology Policy (OSTP), for instance, was created at the height of the Cold War primarily to allow the president to understand the nuances of high-technology weapons and thereby control their development and deployment through his interactions with Congress and the military.⁷

Yet OSTP never enjoyed a monopoly of influence within the White House in this domain, much less in other areas of STI policy where it has sought to carve out a role.⁸ The phrase "separated institutions sharing power" captures the micro-processes of STI policy-making at this level as

well as the macro-processes to which Neustadt originally referred. Each of the following kinds of entities may play a role:

1. *The Office of Management and Budget (OMB)*. OMB formulates the president's budget proposal and must approve legislative proposals, major regulations, and public statements by executive branch officials. STI initiatives that have significant budgetary or regulatory implications—which is to say virtually any initiative of any importance—must clear OMB. Unlike the rest of the White House, OMB is primarily comprised of career civil servants, many of whom have long experience in their domains of action and make it something of an exception to the temporal fragmentation described earlier.

2. *Chief of Staff and Policy Councils*. The president's senior advisors translate the president's ideals and objectives into broad programs of action. The National Security Council (NSC), the National Economic Council (NEC), and the Domestic Policy Council (DPC) are the White House units that staff these advisors, and their initiatives commonly include STI components.⁹ Immigration reform, for instance, which falls mainly within DPC's purview under President Obama, has important implications for the science, technology, engineering, and mathematics (STEM) workforce.

3. *Specialized Offices*. Like OSTP, the Council of Economic Advisors (CEA), the Council on Environmental Quality, and similar offices provide the White House with specialized expertise. As their names suggest, they, too, are often involved in STI policy-making. CEA's annual report to the President on economic conditions, for instance, typically has at least one chapter that focuses on technological innovation.

4. *Liaison Offices*. An array of White House offices connect the president to external constituencies, including Congress, the media, states and local-

ties, interest organizations like businesses, and demographically-defined groups of voters. Because STI policy-making responsibilities are shared with other government institutions and because STI capabilities lie in the private sector as well as the public sector, these offices may play a role in White House STI policy-making. The president's proposals to slow the pace of climate change, for example, touch on all of the constituencies listed above.

5. *Personal Offices*. In addition to the president, the vice president and the president's spouse (known as the First Lady) have become policy-making principals whose interests may extend to STI policy. Vice President Al Gore, for example, had been deeply involved in STI issues during his Congressional career and, as a result, his office was a hub for such issues in the Clinton White House.

I do not mean to imply that all of these units are equally influential. OMB has unique legal authority. The chief of staff typically has unique access to the president and control over his time and attention. The policy councils are often in a position to filter proposals that arise in other White House units. OSTP, on the other hand, has historically been less powerful than the policy councils and is subordinate to the chief of staff. To be effective within the White House, even in the relatively narrow domain of STI policy, the presidential science advisor (as the director of OSTP is colloquially known) must usually seek assistance within and even outside of the White House.¹⁰ For instance, if the science advisor seeks to boost the R&D budgets of particular agencies, he is likely to be more effective if such a proposal is supported by OMB, is linked to the president's priorities as understood by the chief of staff and policy councils, and is echoed by external interests that the president cares about, such as industry or regional leaders.

FRAGMENTATION STRONGLY INFLUENCES THE PRESIDENT'S ROLE IN STI POLICY

It should be clear from this brief exposition that neither the president nor any member of the White House staff, including the science advisor, can do much of great significance by fiat. To be sure, the president can issue orders to executive branch agencies, provided that these orders are supported by plausible interpretations of statutes and regulations (including appropriations statutes that specify how these agencies are to spend their budgets). In many instances, the internal fragmentation of Congress provides latitude for the president to develop legal interpretations that are amenable to his objectives, because Congress must build so many compromises, and even contradictions, into the law in order for bills to pass. Similarly, the fragmentation of the federal judiciary may allow the president to choose among contending interpretations. Yet, attempts by the president to push interpretive boundaries very far will typically provoke a backlash from the other governmental institutions, the private sector, or the public.

To be effective, therefore, the president must adapt to the constraints imposed by the office and the political environment in which he seeks to govern. The work of Neustadt and his followers suggests three very broad axioms that might guide the presidential role in STI policy-making.

1. *Allies and coordination are essential for the president to make progress*. The most essential allies for STI policy are usually members of Congress and leaders of industry and academia, although in some areas of STI policy, other allies may be equally important. New alliances often have to be built around each presidential initiative, in part because the U.S. political party system is so weak that the president cannot count on his party to provide sufficiently strong coordination to overcome fragmentation. Energy-

related initiatives, for instance, are subject as much to regional interests that cross party lines as to the ideological interests that determine partisanship.

2. The president's most important power is the power to persuade. Shared goals and ideas are perhaps the most potent forces for overcoming fragmentation, and the president is the actor best positioned to advance them. No member of Congress or the Supreme Court, governor, or private citizen has as great an ability to share a message and draw an audience. The idea of a "global war on terror," advanced by President George W. Bush, for example, legitimated wide-ranging STI policies that often won bipartisan majorities in Congress and secured substantial cooperation from private-sector actors, such as the defense and telecommunications industries.

3. No issue is ever closed, so the president must be prepared to sustain any initiative in multiple arenas over a period of years. Institutional fragmentation creates many opportunities for critics and opponents to seek to modify or block presidential initiatives. Even if the president is successful in Congress, the private sector, and the public, his efforts may nonetheless be blocked on some STI issues by the states or by the courts. These processes often take years to carry out, allowing events, elections, and the sheer passage of time to blunt presidential momentum. The impact of President George W. Bush's policy restricting the use of human embryonic stem cells, for instance, was limited by the state of California's willingness to invest in this area of research.

ADVANCED MANUFACTURING POLICY UNDER PRESIDENT OBAMA

The Obama administration's advanced manufacturing policy provides a good illustration of these axioms and the

underlying argument about fragmentation. As suggested earlier, my claims would also find support in analyses of other major STI issues in recent years, including energy and climate change, immigration, and counter-terrorism.

President Obama argues that manufacturing, especially advanced manufacturing, is an essential element of U.S. strength and prosperity. It underpins the nation's defense enterprise. It comprises the bulk of international trade. It drives many regional economies. U.S. manufacturing was in a steep decline throughout President George W. Bush's administration, and the decline was dramatically worsened by the recent recession, stimulating the current administration's effort.

This effort depends fundamentally on the private sector, which owns and operates the vast majority of U.S. manufacturing facilities. Not surprisingly, advanced manufacturing policy formulation has relied on external advisory groups, such as the President's Council of Advisors on Science and Technology (2011) and the Advanced Manufacturing Partnership (2012), populated by CEOs and academic leaders.¹¹ Many of the administration's policy proposals, such as the National Network for Manufacturing Innovation (whitehouse.gov, March 9, 2012), would establish cooperative organizations that involve industry, academia, state and local governments, and federal agencies.

The administration has also sought to overcome fragmentation within the executive branch and the White House by creating new coordinating bodies. A working group co-chaired by representatives of the Departments of Commerce, Defense, and Energy prepared a national strategic plan for advanced manufacturing in 2012.¹² A White House Office of Manufacturing Policy, co-chaired by the national economic advisor and the Secretary of Commerce, was set up that year as well (whitehouse.gov, December 11, 2011).

The U.S. public is very supportive of the U.S. manufacturing industry, and President Obama has sought to build a broad consensus for his policy proposals on that foundation. He featured advanced manufacturing in his last two State of the Union addresses to Congress as well as a number of official and campaign events over the past two years. His arguments rely on the opportunity for new jobs and community renewal as well as on the threat posed by foreign control of manufacturing capabilities.

Despite President Obama's use of these tools and tactics, fragmentation has limited his success in enacting his advanced manufacturing agenda. Within the White House itself, the tax and trade components of this agenda, in particular, have been hotly debated. The trade components face opposition from those who believe strongly in the principles of open markets and free trade. And the tax components provoke pushback from non-manufacturing interests that would bear a larger fiscal burden if the manufacturing sector is subject to lower tax rates.

Beyond the White House and especially in Congress, these dynamics are magnified. Proposals to expand spending on advanced manufacturing R&D and training pose difficult fiscal tradeoffs even for supporters in the current climate. Ideological skepticism among conservatives has been fanned by conflict into mistrust of all proposals to expand the federal government's reach, especially proposals made by the Obama administration.

CONCLUSION

Fragmentation limits the ability of any president to make STI policy. The president has many resources that can help him overcome fragmentation. The resources required and the degree of success depend on circumstance as well as the president's skill. He is not necessarily a hapless giant, but he must be lucky as well as clever to have a giant impact.

Endnotes

1. Richard E. Neustadt, *Presidential Power* (New York: Wiley, 1960).
2. National Science Board, *Science and Engineering Indicators* (Washington, DC: NSB, 2012).
3. National Academy of Sciences, Board on Science, Technology, and Economic Policy, *Best Practice in State and Regional Innovation Initiatives* (Washington, DC: National Academies Press, 2013).
4. Richard K. Lester and David M. Hart, *Unlocking Energy Innovation: How America Can Build a Low-Cost, Low-Carbon Energy System* (Cambridge, MA: MIT Press, 2011).
5. Hugh Heclo, *A Government of Strangers: Executive Politics in Washington* (Washington, DC: Brookings Institution Press, 1977).
6. Samuel Kernell, "The Evolution of the White House Staff," in James P. Pfiffner, ed., *The Managerial Presidency* (Belmont, CA: Wadsworth, 1991).
7. Wang Zuoyue, *In Sputnik's Shadow: The President's Science Advisory Committee and Cold War America* (New Brunswick, ME: Rutgers University Press, 2008).
8. David M. Hart, "An Agent, Not A Mole: Assessing the White House Office of Science and Technology Policy," *Science and Public Policy*, 2013. First published online August 25, 2013. DOI 10.1093/scipol/sct061.
9. These are the current names of the policy councils in the Obama administration. The NSC is a statutory body and has been present in every administration since its creation in 1947. The NEC and DPC are formed by executive order, but most administrations have had bodies with the same function, if not always the same name.
10. David M. Hart, "Managing Technology Policy at the White House," in Lewis M. Branscomb and James H. Keller, eds., *Investing in Innovation* (Cambridge, MA: MIT Press, 1998), 438–61.
11. See Advanced Manufacturing Partnership Steering Committee, *Capturing Domestic Advantage in Advanced Manufacturing* (Washington, DC: Executive Office of the President, 2012); President's Council of Advisors on Science and Technology (PCAST), *Ensuring American Leadership in Advanced Manufacturing* (Washington, DC: Executive Office of the President, 2011).
12. National Science and Technology Council, "A National Strategic Plan For Advanced Manufacturing," February 2012.

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