

**Building an Innovation Infrastructure:
Insights from the Rise of the NSF**
Project on History and Strategy Insight Memo
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Policy Context: China's rise as a strategic and technological competitor has generated concern that the United States may lose its innovation edge. The broad framing of this challenge has encouraged deeper examination of how the United States government can restore American scientific and technological leadership, not just in narrow defense applications but in the basic research and development that is so important to economic growth. Since the Cold War ended the United States has followed a policy of steady decline in federal spending on R&D. Spending peaked at 12% of the federal budget in the middle of the 1960s, but now stands at just [3%](#).

The late 1950s began a golden age for American S&T renewal, the moment the federal government committed to building the long-term educational and research foundations for 70 years of U.S. dominance. The creation of the cornerstone of civilian S&T investment, the National Science Foundation, represents an important window into that story. The early era of the NSF offers a cautionary tale of the political, bureaucratic, and legislative challenges, even when the idea of a competitive federal science and technology policy enjoys widespread support. In particular, the lessons of that moment point to the need for concerted advocacy and balance between defense and basic research.

Historical Context: The impetus for federal investment in non-military scientific discovery and long-term research flowed from the Second World War, in which weaponry, sensory technology, automation and codebreaking played an unprecedented role. President Franklin Roosevelt asked Vannevar Bush, the Director of the wartime Office of Scientific Research and Development, for ideas on how the investment model that had led to such wartime success could be used to generate peacetime benefits in areas ranging from health to labor. In 1945, Bush produced an important study, [Science—The Endless Frontier](#), outlining a vision of robust federal support for advancing education and discovery and arguing that such support was a “[vital interest](#).” Five years later, Congress passed legislation creating the National Science Foundation. Upon the occasion, President Truman explained, “We have come to know that our ability to survive and grow as a Nation depends to a very large degree upon our scientific progress.... We must maintain our leadership.”

As policymakers consider whether a new infusion of federal dollars and new organizational structures might be necessary, it is worth understanding how the United States undertook such initiatives in the past.

Historical Insights from the Rise of the NSF

1. **Broad recognition of a long-term problem is not enough to drive change.** In retrospect, the NSF fits neatly into a narrative of the 1950s and 60's that celebrates American urgency and mobilization, but in fact it took five years to pass the legislation and even longer to fund the NSF adequately. Despite widespread understanding of the American scientific and technological deficiencies outlined in Bush's report, debates over patent ownership, the geographic distribution of grants, the place of the social sciences, and administrative control hampered the creation of the NSF, which was then hobbled by miniscule budgets well into the 1950s.
2. **A threat-based motivation could distort the balance between funding for defense R&D and basic research.** During the first few years of the NSF's existence it languished with barely enough funding to staff the building. This was a phenomenon that occurred across federal S&T investment with military specific applications rather than long-term basic research dominating the overall federal investment.
3. **Articulating a clear purpose is more effective than focusing on general technological competition.** In the early years of the NSF's existence, advocates of S&T investment could articulate an abstract argument, but that was only enough to prepare departments and agencies for a potentially well-funded future. A significant breakthrough occurred in 1955 with the publication of an assessment of what the Soviets were doing to advance their own scientific education and training. That report *Soviet Professional Manpower* allowed for a clear net assessment. It presented an alarming comparative assessment rather than a general warning, convincing key congressional skeptics of federal funding to overcome their skepticism of federal spending for scientific education.
4. **Domestic concerns will always play a central role in national security debates about innovation and education.** The Sputnik moment provided the impetus for Congress to overcome various elements of inertia, penny-pinching and partisan gridlock – but it had lasting and significant consequences for the role of government in education and innovation. There will always be advocates for and against the domestic political ramifications of policies designed to mobilize the nation for great power competition.
5. **Powerful and necessary government initiatives sometimes take years to mature.** Since its conception in 1945 the NSF took nearly two decades to achieve Vannevar Bush's vision for a well-funded mechanism to promote STEM research and education. It took both patience and crisis to turn the NSF into the success story that we associate with the late 1950s.

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