

Analysis of Historical Federal R&D Priorities: The OMB-OSTP Memorandum and the R&D Section of the Analytical Perspectives in the President's Budget

[Casey Roepke](#)¹, [Brian Zuckerman](#)²

¹U.S. Department of Energy, Office of Renewable Energy and Energy Efficiency, Washington, D.C., U.S.A.

²Institute for Defense Analyses, Science and Technology Policy Institute, Washington, D.C., U.S.A.

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Corresponding author: bzuckerm@ida.org

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Executive Summary: Each year, the directors of the White House Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB) jointly produce a memorandum of research and development priorities and how those priorities align with the fiscal year budget. This memo guides the actions of executive branch departments and agencies towards the administration's science and technology priorities. By presenting these priorities yearly, these memoranda serve as a record of the science and technology priorities of respective Presidential administrations and, in turn, can reflect a changing science and technology policy landscape over the duration of several Presidential terms. This paper assesses how science and technology policy priorities, as established in these memoranda, are reflected in the Presidential budget within and across administrations. Additionally, this paper compares and analyzes priority topic areas from the OMB/OSTP memos with another representation of science and technology areas of emphasis: the research and development (R&D) section of the Analytical Perspectives in the President's budget. The Analytical Perspectives document highlights items from the Presidential budget requests. This paper discerns the extent to which these two sources of priority-setting become aligned in order to identify trends in which science and technology topics are prioritized by the White House across time and administration. This study addresses two core research questions: 1) How do science and technology priorities change over time, both across and/or within Presidential administrations?; and 2) To what extent, if any, are the ideas in the OMB/OSTP science and technology priorities memoranda and the Analytical Perspectives documents aligned?

I. Introduction

The White House Office of Science and Technology Policy (OSTP) within the Executive Office of the President (EOP) is dedicated to the guidance and coordination of the President's science and technology agenda, including Federal research and development (R&D), interagency collaboration, and external partnerships with academia, industry, government bodies, and other stakeholders. OSTP is mandated to advise the President on science and technology topics and policy, which includes responsibilities such as leading interagency groups,

coordinating engagements with academia and industry, and managing National Science and Technology Council (NSTC) subcommittees (42 U.S. Code 6614). Each year, the directors of OSTP and the Office of Management and Budget (OMB) produce a memorandum of science and technology priorities as inputs to the fiscal year budget. The OMB/OSTP science and technology priorities memorandum is directed towards executive branch departments and agencies and is intended to shape agency and department budget plans and support interagency coordination for the given fiscal year (Young and

Prabhakar 2023). Following the release of these memoranda, OMB's Presidential budget requests are accompanied by Analytical Perspectives documents. Analytical Perspectives documents are released annually to highlight the full budget request, and the R&D section provides context to items in the broader requested budget. As a summary, the chapter does not explain every requested dollar; instead, the document presents areas of emphasis within that year's budget request; these areas of emphasis can be used as a proxy for priority topics to analyze against the OMB/OSTP memoranda. By presenting these priorities yearly, these documents serve as a record of the science and technology priorities of respective Presidential administrations and, in turn, can reflect a changing science and technology policy landscape over the duration of several Presidential terms.

II. Background

The OMB/OSTP science and technology priorities memoranda are one tool that OSTP uses in helping to shape agency activities in light of the administration's agenda. While the OMB/OSTP science and technology priorities memoranda are aimed at shaping agency activities in light of the administration agenda, these activities are enablers of the fiscal year budget. In theory, the federal budget process consists of several phases: 1) presidential planning, including the release of the priorities memorandum in July–September; 2) OMB review and coordination, resulting in the Analytical Perspectives budget request the following February–March; 3) Congressional deliberations and appropriations of the budget over the summer session, in which the House and Senate budgets must come to reconciled agreement; and 4) the implementation of the budget at the start of the new fiscal year in October (Hourihan 2014). From planning to execution, the federal budget process lasts about three years. Presidential administrations aim to maintain consistent, unified messaging about budget priorities in Congressional appropriations.

There is limited academic literature evaluating the effectiveness of OSTP in relation to research and development funding and federal budgets. David Hart argues OSTP's function should advance the vision of the Presidential administration and, as such, should be assessed against four distinct criteria: 1) the ability of the Office to kill bad ideas;

2) the ability to mobilize scientific expertise to respond to national crises; 3) the ability to develop Presidential policy initiatives with respect to new science and technology issues; and 4) multi-agency coordination (Hart 2014). While Hart's first two criteria are less central to this research, the latter two criteria—policy initiative development and interagency coordination—are more germane to the purpose of OSTP science and technology priority-setting memoranda. The annual priority memoranda authored by OSTP and OMB aim to throw political weight behind science and technology issues, Presidential policy initiatives, and multi-agency activities emphasized by the current administration—though the literature that assesses OSTP's success in meeting these criteria is limited. While OSTP endeavors to inform federal R&D spending through administration priorities, the Office plays only an advisory role in the budget request process (42 U.S.C 6613(b)). As such, OSTP faces numerous challenges in the pursuit of shaping R&D budget outcomes, an issue that is currently underexplored in the literature (Halloran 2015).

While the effectiveness of OSTP's influence on Federal R&D expenditure is unclear, there exists a larger pool of research on the federal R&D budget process itself. The federal R&D budget process is a complex, multi-year endeavor with several stakeholders. Both chambers of Congress, the White House, and other government agencies and departments are required to negotiate individual goals to plan, request, and pass the federal budget—only after which appropriations can begin to be implemented. Inconsistency in R&D funding for specific science and technology topic areas, especially basic research, has been linked to the change of priorities between Presidential administrations (Evans, Hazan, Kamepalli, and Matthews 2021). While Presidential administrations provide priorities to Congress through annual budget requests, Congress is the arbiter of appropriations; R&D funding is not directly determined by the administration priorities presented in the OSTP memoranda (Hammond and Rosenstiel 2020). Still, statistical evidence corroborates that Presidential administrations hold some influence over incorporating priority areas into congressional appropriations, and, in turn, R&D budget outcomes (Krause and Cook 2015).

Building on these general findings regarding the role of administration priorities in the budget process, this study investigates the relationship between two key policy levers used by the executive branch: the science and technology priority memoranda, released by OSTP and OMB, and the Presidential budget requests, released by OMB. In this analysis, these two data sources are leveraged to identify trends in which science and technology topics are prioritized by the White House and to answer the following questions: 1) How do science and technology priorities change over time, both across and/or within Presidential administrations?; and 2) To what extent, if any, are the ideas in the OMB/OSTP science and technology priorities memoranda and the Analytical Perspectives documents aligned?

To answer these questions, the OMB/OSTP science and technology priorities memoranda were characterized and examined for emerging patterns of longitudinal consistency and fluctuation in the key themes elevated to priority status by OSTP. Administrations produce a priority memorandum every summer, intended to set priorities for the funding to be appropriated two years later (i.e., a memorandum released in summer 2024 sets priorities for fiscal year 2026 budget planning). Priorities are set based on choices made by the administration itself in addition to external factors (e.g., the COVID-19 pandemic leading to priorities in the life and health sciences, the terrorist attacks of 9/11 leading to increased emphasis on homeland security R&D). Coding priorities across OMB/OSTP memoranda and in the Analytical Perspectives documents enables the observation over time of the change in science and technology priorities within and across Presidential administrations.

Topics were coded to characterize which priorities were consistent or inconsistent throughout administrations, as well as which priorities remained conceptually or definitionally consistent but were titled differently under varied administration politicking. Additionally, the Analytical Perspectives documents were analyzed to determine what science and technology topics are prioritized in the requested funding. Ultimately, this analysis will address the extent to which the OMB/OSTP memoranda priorities survive and

influence the budget request process and appear in the Analytical Perspectives documents.

III. Methodological approach

The methodological approach for this research depended on two main sources of data: the OMB/OSTP science and technology priority memoranda, and the Analytical Perspectives documents. For this research, the OMB/OSTP memoranda were collected and analyzed first to provide a basis with which to analyze and compare the Analytical Perspectives documents.

i. OMB/OSTP science and technology priorities memoranda

Keyword and topic analysis were performed on the available memoranda data. OSTP memoranda were analyzed based on the accessibility of the documents: FY00, FY01, FY05, FY06, FY08, FY09, FY12, FY14–17, and FY19–25.¹ These documents include science and technology priorities for the Clinton, Bush, Obama, Trump, and Biden administrations. Each administration organized its memoranda in individual documents, and while there was some consistency in the structure of each administration's documents—for example, the same usage of bold, italicized, and underlined text to indicate different levels of topics—this consistency did not extend between different Presidential administrations. To approach the discrepancies in text structure, the memoranda were coded within each Presidential administration individually.

Memoranda were coded by levels of topic areas. High-level topics were often indicated by bold, underlined, or centered text. Plain text in paragraph or bullet point form was considered the lowest level of memorandum text. Across all coded memoranda, there were one to two medium-level topics, typically characterized by any number of text or title

¹ These years refer to the budget year, not the year in which the document was published. For example, FY25 refers to the fiscal year 2025 memo released in calendar year 2023 and the fiscal year 2025 budget request released in calendar year 2024. There was no memorandum published for FY10 and FY18 because the administrations were term-limited and did not release budget guidance for a budget the administration would not be writing. Other gaps (FY02-04, FY07, FY11, FY13) were due to lack of public access to memoranda.

alterations: bold, italics, underline, indentation, bullet points, or a combination of several.

Once coded into high-level, medium-level, or plain text within one administration, the topic areas were then compared across administrations. The coded levels of topic areas were aggregated side by side, which allowed interpretation of the highest-level titles as too broad to be in scope for science and technology priority areas (for example, “R&D program guidance” was a title which encompassed all other topics and was not included in scope of identifying priority topic areas). Similarly, the plain-text data were too detailed and specific to be considered as topic areas. The comparison across administration memoranda demonstrated that only medium-level titles indicated specific topic areas for science and technology priorities. As such, the medium-level titles were treated as topics for further analysis.

Once medium-level titles were identified as topic areas, further characterization was required to identify the science and technology concepts encompassed within the memorandum language of topic areas. The plain-text descriptions provided references to key technology areas, scientific innovation, government programs or activities, and other details to aid in characterizing how each administration defined the topic area. These plain-text descriptions were used to define and group topic areas together when applicable. Once each medium-level title was assigned a plain-text informed topic area, science and technology priority topic areas were mapped for each occurrence across all analyzed OSTP memoranda.

ii. Analytical perspectives of the budget of the United States

The appropriate fiscal year Analytical Perspectives documents were found in the corresponding chapters for “Research and Development Expenditures,” the section to which science and technology is delegated. Analytical Perspectives documents were analyzed for the fiscal years with an accompanying memorandum. As was true for the OMB/OSTP science and technology priorities memoranda, the format was dependent on which Presidential administration the budget request fell under; similarities between document format and structure occurred when the budget request came

from the same Presidency, and differences occurred in the length and detail of budget content. While budget requests were first examined for specific dollar amounts, it soon became clear that this direction was untenable—some budget requests organized topic areas under specific funding amounts, while others mentioned topics as a subset of a larger funding area, and still others only described the funding amounts by Federal agency or office. Similar to the OMB/OSTP memoranda, the budget requests were coded individually to address differentiation among administration formats.

There were two levels of information in the budget requests. The highest-level title was in the form of a header within the budget request. These headers were typically written in bold and either described a topic area directly or proposed a mission—for example, “Improving Americans’ Health through Innovation in Life Sciences.” The other level text was the content following these headers, which described relevant work or justification for the budget request in more detail. When compared to the OMB/OSTP memoranda, the headers were comparable to the medium-level titles, and the text was similar to the plain text. Thus, for comparative purposes, the budget request headers were analyzed as a proxy for science and technology priorities. Topics were mapped for each occurrence across all analyzed budget requests.

The choice to identify priority topics from the titles/headers of the memoranda and budget requests was made to enable analysis across documents, which varied from administration to administration (and sometimes even within one administration’s term). Drawing from all text included in these documents for topics would not allow for a tractable analytical approach. However, by choosing to focus on the titles, certain words in the main text are missed. For example, the FY20 OMB/OSTP memo includes quantum computing in a title (American Leadership in Artificial Intelligence, Quantum Information Sciences, and Strategic Computing) but not in the FY20 budget, which phrases the title as “American Leadership in Industries of the Future” despite including AI and quantum computing in the related paragraphs. Because this approach focuses on headers and not plain text, quantum computing is missed in the FY20 budget. However, the broader topic of critical and

emerging technologies (CET) was identified in part to mitigate this methodological challenge, as CET can be mapped for both the FY20 memo and budget request while the specific quantum computing topic is reflected only in the memo header.

iii. Comparison

Topic areas were identified in both document types by one coder and confirmed by a second coder for reproducibility of the analysis. The topics identified by OMB/OSTP memoranda medium-level titles and the Analytical Perspectives document headers were compared with each other to identify a list of science and technology topic areas to map across time and administration. The original list derived from OMB/OSTP priorities included the same topics discussed in the budget requests, with some additional processing; for example, a header in the FY16 memo reading “Improving Americans’ Health through Innovation in Life Sciences, Biology, and Neuroscience” was coded as “Life and Health Sciences” for analysis (Deese and Holdren 2014).

While OMB/OSTP priorities and budget request topics areas were both mapped separately for each available fiscal year, analysis was conducted to map these data in comparison. Only fiscal years for which both an OMB/OSTP memorandum and an Analytical Perspectives document were available were analyzed; for these years, two analyses were conducted. First, all topics were mapped for both data sources without regard for alignment between the two. Then, only the topics that matched for both data sources in the same fiscal year were mapped to indicate the overlap and alignment between these data.

IV. Analysis and results

i. OMB/OSTP science and technology priorities memoranda

Overall, 18 OMB/OSTP memoranda were analyzed for priority topic areas in science and technology. Across these 18 documents, 53 individual topic areas, including some subcategories of more general topics, were identified as administration science and technology priorities. Five topic areas were demonstrated to be an administration priority in at least one fiscal year’s OSTP memorandum for all five administrations. The consistent priorities identified

are: critical and emerging technologies (CET),² defense, improving government operations, life and health sciences, and STEM education. All of these topic areas but one—STEM education—were larger groupings with more specific subcategories that encompassed various administration priorities. The larger groupings were identified to establish consistency of general themes while allowing for specialized technologies or concepts as highlighted by some administrations.

Several topic areas appeared as priorities in the available data for three or four administrations but not consistently across all five. Climate and climate change were priorities for all administrations but the Trump administration, and energy was a priority for all administrations but the Clinton administration. Several subcategories of CET, such as AI, biotechnology, and quantum computing, were priorities for three Presidential administrations, though not consecutively. Detailed tables of occurrences of science and technology priority topic areas summarized by administration are included in the Appendix.

Some topic areas were referred to in different memoranda with the same terminology, but in-depth examination of the definitional plain text revealed key distinctions in how each administration approached the science and technology concept. National security, for example, included “military superiority” under the Trump administration; innovations in life and health sciences incorporated pandemic preparedness and prevention only in the Biden administration. These examples show how the

² The definition for CET used in this analysis was drawn from the Critical and Emerging Technologies list compiled by the National Science and Technology Council. This list is comprised of: advanced computing; advanced engineering materials; advanced gas turbine engine technologies; advanced manufacturing; advanced and networked sensing and signature management; advanced nuclear energy technologies; artificial intelligence; autonomous systems and robotics; biotechnologies; communication and networking technologies; directed energy; financial technologies; human-machine interfaces; hypersonics; networked sensors and sensing; quantum information technologies; renewable energy generation and storage; semiconductors and microelectronics; and space technologies and systems. (National Science and Technology Council 2022).

definitions of topics can expand with new administrative emphases—or technological advancements—while maintaining the same conceptual categorization. While memoranda were analyzed with reference to detailed definitions and discussion of the science and technology priority topic areas as found in the plain-text descriptions, ultimately, determining how some concepts and topics were meant to be interpreted by OSTP lay beyond the scope of this research with solely the memoranda text and levels of topic titles accessible to analyze.

ii. Analytical perspectives documents

From the total number of documents available, R&D chapters of the 18 Analytical Perspectives documents released in the fiscal years pertaining to the available OSTP memoranda were analyzed to compare science and technology priority topic areas. Topic areas were identified independently from memoranda topics, and although these documents included fewer total topic areas than from the memoranda, the topics identified in Analytical Perspectives matched the topic areas identified in the OSTP memoranda. Priority topic area occurrence across fiscal year and Presidential administration were mapped for the budget requests. Only one topic area—critical and emerging technologies, a larger grouping of eight subcategories—was a Presidential priority in at least one fiscal year’s budget request for all five administrations.

The climate and environment and climate change categories were present in the budget requests of all administrations except for the Trump administration; defense was a priority in all budget requests but the Clinton administration. Topic areas represented across three Presidents’ budget requests include information technology (within critical and emerging technologies),³ energy,⁴ and life and health sciences.⁵

iii. Comparative analysis

The occurrences of science and technology priority topic areas across both the OMB/OSTP memoranda

and the Analytical Perspectives documents can be used to compare the extent to which administration priorities are aligned across both priority documents. To compare these data sources, the full list of science and technology priority topic areas were mapped with the topic’s occurrence in each of the five Presidential administrations (fiscal years between 2000–2025) onto the same table (Table 1). In Table 1, “M” represents a priority from the OMB/OSTP memorandum, “AP” represents a priority from the Analytical Perspectives document, and “B” refers to when a topic is present in both the memorandum and the budget request for the same fiscal year. Table 1 displays fully mapped occurrences of priority topic areas in the memoranda and budget requests, and in the overlap between the two data sources. This table is color-coded to demonstrate consistency: blue indicates consistency across administrations, and gray indicates consistency within one administration.

As represented by fiscal year in Table 1 and summarized below in Table 2, there are 261 priority topic occurrences (counting all ‘M,’ ‘AP,’ and ‘Both’) across the selected administrations. Of these 261 occurrences, 110, or 42.1%, are topic occurrences that appear in both data sources for the same fiscal year. Twenty-three priority topic areas (Table 1 rows) appeared in alignment for at least one year. Of these 23 overlaps, 8 were priorities consistent across administrations, and 10 were consistent within an administration. The remaining 5 were in alignment for both documents for one year. Over one-third of the mapped topic occurrences show alignment between the OMB/OSTP memoranda and Analytical Perspectives documents.

³ Information technology was a priority in the Clinton, Bush, and Obama Administration memoranda.

⁴ Energy was a priority in the Bush, Obama, and Trump Administration memoranda.

⁵ Life and health sciences was a priority in the Obama, Trump, and Biden Administration memoranda.

Priority Areas	Clinton Admin		Bush Admin				Obama Admin					Trump Admin				Biden Admin		
	00	01	05	06	08	09	12	14	15	16	17	19	20	21	22	23	24	25
Agriculture											AP	AP	M					
Arctic											B				M			
Aviation	M	M				M												
Catastrophic Risk Management												AP						M
Critical and Emerging Technologies	M	B	B	B	B	B	B	B	B	B	B	AP	B	B	M	B	B	B
<i>Advanced Manufacturing</i>								B	B	B	B		M	M	M			
<i>AI</i>	M	M										AP	M	M	M	M	B	
<i>Biotechnology</i>				M	B	AP						AP	M	M	M	M	M	M
<i>Computing</i>	M				B							AP	M		M			
<i>Communications</i>														M	M			
<i>Information Technology</i>		B	B	B		B		B	M	M	B							
<i>Nanotechnology</i>		M	B	B	B	B		B			AP							
<i>Quantum Computing</i>				M										M	M		M	
<i>Semiconductors</i>														M	M			
Climate and Environment	M	B	B	B	B	B	B	B	B	B	B					B	B	B
<i>Climate Change</i>	M	B	B			M	B	B	B	B	B					B	B	B
<i>U.S. Global Change Research Program</i>	M	B																
Competitiveness																	M	B
Connectivity and Autonomy													M					
Critical Materials														M				
Defense	M	M	B	B	B	B		AP	B	B	M	B	B	B	M	B	AP	AP
Earth Observations	M									B	B							
Earth Systems Predictability														M	M			
Economy												M						
Energy			B		M		B	B	B	B	B	B	M	M	M	M	M	M

<i>Energy (Clean Energy)</i>								B	B	B	B	B						
<i>Energy (Fossil, Nuclear and Renewable Energy)</i>													B	M				
<i>Energy (Hydrogen)</i>			B	AP	AP													
<i>Energy (Security)</i>					M													
Equity															B	B	B	
Food Safety	M	M																
Improving Government Operations	M	M				M	B	AP			B	M	M	M	M		M	M
<i>Data</i>	M	M												M	M			
<i>Federal Scientific Collections</i>					M													
<i>Infrastructure (Government)</i>							B	AP					M		M			
<i>Infrastructure (Research)</i>	M	M								M	M	M	M					M
<i>Lab to Market</i>										AP			M	M	M			
<i>Open Science</i>																		M
<i>Public-Private Partnerships</i>													M					
<i>Science of Science Policy</i>					M													
Innovation and Commercialization									B	B								
International Cooperation																		M
Life and Health Sciences	M	M	M	M	M	M	B	B	B	B	B	B	M	M	M	B	B	B
<i>Life and Health Sciences (Health Outcomes)</i>																		B
<i>Life and Health Sciences (Plant Genome)</i>	M	M																
<i>Life and Health Sciences (Pandemic)</i>																B	B	
Natural Disasters and Space Weather																		M
Ocean				AP	AP	M				B				M	M			

R&D for informed policy-making and management				M	M	M							
Space				B	AP	AP	AP	AP	AP	M	B		
STEM Education	M	M	M	B	B	M	AP	AP	M	M	M	M	AP B
Supply Chain													M
Vehicles	M								AP		M		

Table 1: All occurrences of S&T priority topic areas in either the OSTP memoranda (M) Analytical Perspectives documents (AP) or both documents (B).

S&T Priority	Clinton Admin	Bush Admin	Obama Admin	Trump Admin	Biden Admin	Total by source
<i>Memo only</i>	28	14	9	56	16	123
<i>Budget only</i>	0	5	12	8	3	28
<i>Both</i>	5	24	50	9	22	110
<i>Total by admin</i>	33	43	71	73	41	261

Table 2: Number of topic occurrences by data source.

Table 2 counts the number of occurrences of priority topic areas in each fiscal year to produce the number of topic areas prioritized in each administration, which is displayed by data source.

Priority topic areas that only appear in the budget requests are the vast minority across all administrations. Table 2 shows the total number of occurrences of topic areas (as represented by the columns in Table 1), and counts both standalone priorities in one fiscal year and when priorities are repeated over more than one year. Topic areas mentioned only by memoranda ('M,' 123) or appearing in alignment with both data sources ('Both,' 110) appeared with close to matching frequency. A high number of priority topic occurrences in budget requests are mapped to the memoranda ('Both,' 110), but an additional number of memoranda priorities are not echoed in the accompanying budget request ('AP,' 28). The Obama administration had the highest number of topics that appeared in both data sources ('Both,' 50), and the Trump administration had the most topics that appeared in only one data source (64).

Additionally, from this analysis, the overlap between both data sources can be extracted to map only the direct alignment between memoranda and budget requests within and across administrations. Summarizing the priority topic occurrences, 110 topic occurrences appear in both data sources, which represents alignment between the two data sources.

Eight topics were aligned across successive administrations, and one topic (critical and emerging technologies) appeared in both memoranda and budget requests across all administrations. Two topics—STEM Education and Climate and Environment—were priorities for both the Obama and Biden administrations, but not for the Trump administration in between. Similarly, Biotechnology and Computing were both priorities for the Bush and Trump administrations, but not for the Obama administration.

Topics were also examined for their consistency within or across administrations. Table 3 demonstrates the level of consistency; topics were either priorities for multiple consecutive years across more than one administration, within the

same administration, or a priority for only one standalone fiscal year. This table focuses on only the topics named as a priority for both the memorandum and the budget request for the same fiscal year. Topics that were a priority for multiple non-consecutive single years were included as a priority in one year.

Priority for Multiple Years	Number of Topics
Priority Across More than One Administration	31
Priority for Multiple Years Within One Administration Only	48
Priority in One Year	21

Table 3: Topics as a priority for multiple years in both memoranda and budget requests.

Topics are more likely to be consistent within the same administration than any other level of consistency. The topics that were a priority for more than one consecutive year (including both within and across administrations) outnumber those topics that were a priority only in one year, 79 to 21. Thus, topics are nearly four times more likely to appear as a priority for multiple years in a row.

V. Policy implications

This study aimed to analyze the relationship between two of the executive branch's principal policy levers: the annual OMB/OSTP science and technology priorities memoranda and the yearly Analytical Perspectives documents. In doing so, this analysis examined the extent to which priorities are in alignment across these data sources, and whether the alignment changes for those priorities that are consistent within or across administrations. This study addressed the following research questions: 1) How do science and technology priorities change over time, both across and/or within Presidential administrations?; and 2) To what extent, if any, are the ideas in the OMB/OSTP science and technology priorities memoranda and the Analytical Perspectives documents aligned?

Forty-two percent (110/261) of the occurrences of the priority topic areas were found to overlap both the memorandum and the budget request for that fiscal year. This number, while indicative of some alignment between data sources, demonstrates that the majority of priority occurrences are not appearing in both policy documents for the same fiscal year. Beyond the direct alignment between data sources, the comparative analysis also mapped the consistency of overlapped topics. While many topics were consistent within an administration, only one topic was aligned as a priority for both data sources across all administrations: critical and emerging technologies, which is a larger, broader category that includes multiple sub-topics.

The vast majority of aligned priorities occurred when the priority topic was not a one-off theme. The most successfully aligned topic areas were those that emerged early as a priority within one administration and continued to be promoted as a priority through that administration or into the next administration. In addition, topics were four times more likely to be a priority for multiple years in a row when the topic appeared in both the memorandum and budget request for the same fiscal year.

The OMB/OSTP science and technology priorities memoranda and the Analytical Perspectives documents are not fully aligned, but do demonstrate some alignment for priority topics. These priorities change over time, as evidenced by the rhetoric used to discuss topics in only the memoranda. Priorities aligned in both data sources are significantly more likely to persist for more than one fiscal year, and are most likely to be consistent within one administration's priority topics. Based on this analysis, the alignment between the priority memoranda and the Analytical Perspectives documents is not constant, and, as such, OSTP and OMB can increase the extent to which policy priorities are supported in executive branch requests for congressional appropriations. This research demonstrates that OSTP and OMB can increase the extent to which policy priorities are supported in executive branch requests for congressional appropriations by improving the alignment of priorities in these two documents. This would unify the executive branch's priority-setting

guidance for Federal research and development activities.

As administrations continue to highlight Presidential science and technology priorities through OMB/OSTP priorities memoranda and Analytical Perspectives documents, alignment between policy priority documents will further indicate the priorities that remain stable, consistent, and supported across different Presidential administrations and agendas. Future research should consider the appropriations in an extension of the budget requests to further examine the extent to which policy priorities appear in the enacted funding and, thus, the extent to which these policy documents influence appropriations. Further analysis of priorities across administrations and longitudinally could also be used to identify polarization trends in science policy topic areas.

Additionally, interviews with OSTP and OMB representatives can be conducted to understand the process behind the creation of these priority

documents, including where the priorities come from, and what role OSTP plays in the budget itself. Interviews and other mixed-methods research can be used to investigate the “how” and “why” of the process, such as the relationship between the writing of the previous year’s memorandum when producing the current year’s, how the transition between administrations changes the process, how much emphasis is placed on past priorities, and whether an administration’s change in party plays an additional factor. In doing so, future studies can begin to uncover the extent to which Presidential leadership matters in federal science policy: how does political change in the White House affect which policy initiatives flounder or survive in the budget process and beyond the end of an administration? Further research can provide greater understanding and depth into the themes that appear as priorities across administrations and how future OSTP staff should approach the priority-setting process to set up the administration’s science and technology work for success.

Appendix: Priority topic occurrence data consolidated by administration, in which an 'X' denotes a topic was prioritized under that administration.

<u>S&T Priority</u>	<u>Clinton Admin</u>	<u>Bush Admin</u>	<u>Obama Admin</u>	<u>Trump Admin</u>	<u>Biden Admin</u>
Agriculture				X	
Arctic			X	X	
Aviation	X	X			
Catastrophic Risk Management					X
Critical and Emerging Technologies	X	X	X	X	X
Advanced Manufacturing			X	X	
AI	X			X	X
Biotechnology		X		X	X
Computing	X	X		X	
Communications				X	
Information Technology	X	X	X		
Nanotechnology	X	X	X		
Quantum Computing		X		X	X
Semiconductors				X	
Climate and Environment	X	X	X		X
Climate Change	X	X	X		X

U.S. Global Change Research Program	X				
Competitiveness					X
Connectivity and Autonomy				X	
Critical Materials				X	
Defense	X	X	X	X	X
Earth Observations	X		X		
Earth Systems Predictability				X	
Economy				X	
Energy		X	X	X	X
Energy (Clean Energy)			X		
Energy (Fossil, Nuclear and Renewable Energy)				X	
Energy (Hydrogen)		X			
Energy (Security)		X			
Equity					X
Food Safety	X				
Improving Government Operations	X	X	X	X	X
Data	X			X	
Federal Scientific Collections		X			
Infrastructure (Government)			X	X	
Infrastructure (Research)	X		X	X	X
Lab to Market				X	
Open Science				X	
Public-Private Partnerships				X	
Science of Science Policy		X			
Innovation and Commercialization			X		
International Cooperation				X	
Life and Health Sciences	X	X	X	X	X
Life and Health Sciences (Health Outcomes)					X
Life and Health Sciences (Plant Genome)	X				
Life and Health Sciences (Pandemic)					X
Natural Disasters and Space Weather					X
Ocean			X	X	
R&D for informed policy-making and management			X		
Space			X	X	
STEM Education	X	X	X	X	X
Supply Chain					X
Vehicles	X			X	

Table A1: Summary of Administration Priorities present in OMB/OSTP memoranda.

<u>S&T Priority</u>	<u>Clinton Admin</u>	<u>Bush Admin</u>	<u>Obama Admin</u>	<u>Trump Admin</u>	<u>Biden Admin</u>
Agriculture			X	X	
Arctic			X		
Aviation					
Catastrophic Risk Management				X	
Critical and Emerging Technologies	X	X	X	X	X
Advanced Manufacturing			X		
AI				X	
Biotechnology		X		X	
Computing		X		X	
Communications					
Information Technology	X	X	X		
Nanotechnology		X	X		
Quantum Computing					
Semiconductors					
Climate and Environment	X	X	X		X
Climate Change	X	X	X		X
U.S. Global Change Research Program	X				
Competitiveness					
Connectivity and Autonomy					
Critical Materials					
Defense		X	X	X	X
Earth Observations			X		
Earth Systems Predictability					
Economy					
Energy		X	X	X	
Energy (Clean Energy)			X		
Energy (Fossil, Nuclear and Renewable Energy)				X	
Energy (Hydrogen)		X			
Energy (Security)					
Equity					X
Food Safety					
Improving Government Operations			X		
Data					
Federal Scientific Collections					
Infrastructure (Government)			X		
Infrastructure (Research)					
Lab to Market			X		
Open Science					

Public-Private Partnerships					
Science of Science Policy					
Innovation and Commercialization			X		
International Cooperation					
Life and Health Sciences			X	X	X
Life and Health Sciences (Health Outcomes)					
Life and Health Sciences (Plant Genome)					
Life and Health Sciences (Pandemic)					X
Natural Disasters and Space Weather					
Ocean		X	X		
R&D for informed policy-making and management					
Space			X	X	
STEM Education			X		X
Supply Chain					
Vehicles				X	

Table A2: Summary of Administration Priorities present in Analytical Perspectives documents.

<u>S&T Priority</u>	<u>Clinton Admin</u>	<u>Bush Admin</u>	<u>Obama Admin</u>	<u>Trump Admin</u>	<u>Biden Admin</u>
Agriculture			AP	Both	
Arctic			Both	M	
Aviation	M	M			
Catastrophic Risk Management				AP	M
Critical and Emerging Technologies	Both	Both	Both	Both	Both
Advanced Manufacturing			Both	M	
AI	M			Both	M
Biotechnology		Both		Both	M
Computing	M	Both		Both	
Communications				M	
Information Technology	Both	Both	Both		
Nanotechnology	M	Both	Both		
Quantum Computing		M		M	M
Semiconductors				M	
Climate and Environment	Both	Both	Both		Both
Climate Change	Both	Both	Both		Both
U.S. Global Change Research Program	Both				
Competitiveness					M
Connectivity and Autonomy				M	
Critical Materials				M	
Defense	M	Both	Both	Both	Both
Earth Observations	M		Both		
Earth Systems Predictability				M	
Economy				M	
Energy		Both	Both	Both	M
Energy (Clean Energy)			Both		
Energy (Fossil, Nuclear and Renewable Energy)				Both	
Energy (Hydrogen)		Both			
Energy (Security)		M			
Equity					Both
Food Safety	M				
Improving Government Operations	M	M	Both	M	M
Data	M			M	
Federal Scientific Collections		M			
Infrastructure (Government)			Both	M	
Infrastructure (Research)	M		M	M	M
Lab to Market			AP	M	
Open Science					M

Public-Private Partnerships				M	
Science of Science Policy		M			
Innovation and Commercialization			Both		
International Cooperation					M
Life and Health Sciences	M	M	Both	Both	Both
Life and Health Sciences (Health Outcomes)					M
Life and Health Sciences (Plant Genome)	M				
Life and Health Sciences (Pandemic)					Both
Natural Disasters and Space Weather					M
Ocean		AP	Both	M	
R&D for informed policy-making and management			M		
Space			Both	Both	
STEM Education	M	M	Both	M	Both
Supply Chain					M
Vehicles	M			Both	

Table A3: Summary of All Priorities Across Memoranda and Budget Request Documents. 'M' indicates a priority in that administration's memoranda, 'AP' indicates a priority in that administration's Analytical Perspectives documents, and 'Both' indicates an aligned priority across both data sources.

<u>S&T Priority</u>	<u>Clinton Admin</u>	<u>Bush Admin</u>	<u>Obama Admin</u>	<u>Trump Admin</u>	<u>Biden Admin</u>
Agriculture				Both	
Arctic			Both		
Aviation					
Catastrophic Risk Management					
Critical and Emerging Technologies	Both	Both	Both	Both	Both
Advanced Manufacturing			Both		
AI				Both	
Biotechnology		Both		Both	
Computing		Both		Both	
Communications					
Information Technology	Both	Both	Both		
Nanotechnology		Both	Both		
Quantum Computing					
Semiconductors					
Climate and Environment	Both	Both	Both		Both
Climate Change	Both	Both	Both		Both
U.S. Global Change Research Program	Both				
Competitiveness					
Connectivity and Autonomy					
Critical Materials					
Defense		Both	Both	Both	Both
Earth Observations			Both		
Earth Systems Predictability					
Economy					
Energy		Both	Both	Both	
Energy (Clean Energy)			Both		
Energy (Fossil, Nuclear and Renewable Energy)				Both	
Energy (Hydrogen)		Both			
Energy (Security)					
Equity					Both
Food Safety					
Improving Government Operations			Both		
Data					
Federal Scientific Collections					
Infrastructure (Government)					
Infrastructure (Research)					
Lab to Market					

Open Science					
Public-Private Partnerships					
Science of Science Policy					
Innovation and Commercialization			Both		
International Cooperation					
Life and Health Sciences			Both	Both	Both
Life and Health Sciences (Health Outcomes)					
Life and Health Sciences (Plant Genome)					
Life and Health Sciences (Pandemic)					Both
Natural Disasters and Space Weather					
Ocean			Both		
R&D for informed policy-making and management					
Space				Both	
STEM Education			Both		Both
Supply Chain					
Vehicles				Both	

Table A4: Summary of aligned topics which appear as priorities in both memoranda and budget request documents for the administration. Bold/italicized text indicates continuity across multiple administrations.

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Casey Roepke, M.Sc. Casey Roepke is currently an ORISE Science, Technology, and Policy Fellow in the Department of Energy's Office of Renewable Energy and Energy Efficiency, supporting the Vehicle Technologies Office. Previously, she worked as a Science Policy Fellow at the Science and Technology Policy Institute, gaining experience providing policy research and analysis for Federal agencies and the White House Office of Science and Technology Policy. She is passionate about equitable, sustainable energy technology and a diverse STEM workforce. Casey received her bachelor's degrees in Physics and Politics from Mount Holyoke College and her master's in Applied Physics from the University of Strathclyde.

Brian Zuckerman, Ph.D. Brian Zuckerman has expertise in the areas of program evaluation and scientometrics. His work focuses on federal R&D program performance and agency-wide research portfolios. Brian has also analyzed federal R&D data systems and statistical data collection programs. Before joining STPI, he was a principal at the Center for Science and Technology Policy of Abt Associates Inc. He is a past co-chair of the Research, Technology, and Development Topical Interest Group of the American Evaluation Association. Brian holds a bachelor's in chemistry from Harvard College and a doctorate in technology, management, and policy from the Massachusetts Institute of Technology.

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