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# Structures, Functions, and Processes of Centers of Excellence

An Analysis of Federal Programs



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# About This Report

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Office of University Programs (OUP) is charged with providing streamlined access to the expertise of the nation's colleges and universities to address pressing homeland security needs. As part of that effort, OUP supports university partnerships through its Centers of Excellence (COEs) program, comprising twenty active and emeritus centers. In September 2022, S&T engaged the Homeland Security Operational Analysis Center (HSOAC) to assist OUP in determining the core functions needed to support current and future COEs and to streamline business processes through several related tasks of the DHS COEs Program Analysis project.

More specifically, S&T engaged HSOAC to perform an independent study to assess the structures and functions of DHS and other federal program COEs, including competition, funding, and transition processes. As such, HSOAC was tasked with identifying and reviewing other federal departments and agencies with established COEs. This report presents the methodology for and the results of the project. Based on the completed analysis, the study also provides recommendations for establishing and supporting specific core structures, functions, and processes for federal government programs and COEs, including OUP. These recommendations are intended to enhance the structure and function of COE programs. The findings should be of interest to S&T leadership and OUP management, as well as to the management and leadership of other federal COE programs and Public-Academic research partnerships.

This research was sponsored by the DHS S&T and conducted in the Management, Technology, and Capabilities Program of RAND's Homeland Security Research Division (HSRD), which operates HSOAC.

## About the Homeland Security Operational Analysis Center

The Homeland Security Act of 2002 (Public Law 107-296, § 305, as codified at 6 U.S.C. § 185) authorizes the Secretary of Homeland Security, acting through the Under Secretary for Science and Technology, to establish one or more federally funded research and development centers (FFRDCs) to provide independent analysis of homeland security issues. RAND operates HSOAC as an FFRDC for DHS under contract 70RSAT22D00000001.

The HSOAC FFRDC provides the government with independent and objective analyses and advice in core areas important to the department in support of policy development, decision-making, alternative approaches, and new ideas on issues of significance. HSOAC also works with and supports other federal, state, local, tribal, and public- and private-sector organizations that make up the homeland security enterprise. HSOAC's research is undertaken by mutual consent with DHS and organized as a set of discrete tasks. This report presents the

results of research and analysis conducted under 70RSAT22FR0000066, DHS COEs Program Analysis. The results presented in this report do not necessarily reflect official DHS opinion or policy.

For more information on HSRD, see [www.rand.org/hsrd](http://www.rand.org/hsrd). For more information on this publication, see [www.rand.org/t/RRA2304-1](http://www.rand.org/t/RRA2304-1).

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# Summary

## Issue

The Homeland Security Act of 2002 mandates that the U.S. Department of Homeland Security (DHS) establish university-based centers for homeland security, with the purpose of creating “a coordinated, university-based system to enhance the nation’s homeland security” (S&T, 2022b). Under this mandate, the Science and Technology Directorate’s (S&T) Office of University Programs (OUP) leverages academic expertise and research through the Centers of Excellence (COEs) to address homeland security challenges. These are university-led consortia that “work closely with the homeland security community to develop customer-driven, innovative tools and technologies” and analyses to help secure the nation (S&T, 2022c). The COEs also develop homeland security-related curricula and training (S&T, 2022a).

As OUP executed the COE program, it sought to assess the COEs’ core structures, functions, and processes to determine areas for potential improvements. S&T engaged the Homeland Security Operational Analysis Center (HSOAC) to assist. This assessment necessitated:

- Reviewing the structures, functions, and processes for both current and emeritus COEs;
- Determining potential areas for improvements in the COE program for OUP;
- Performing a comparative analysis of other federally-sponsored COEs to document their structures, functions, and processes; and
- Identifying example structures, functions, and processes from other federally-sponsored COEs that OUP might consider in any improvement efforts.

Using the completed analysis, HSOAC determined the core functions needed to support current and future COEs and to streamline business processes. HSOAC provides recommendations for facilitating stronger outcomes and strengthening research partnerships with academia through federal program COEs.

## Approach

HSOAC reviewed OUP’s program and its COEs; identified and reviewed similar COE programs and entities within other federal organizations; and performed data analysis on the structures, functions, and processes of COEs with the intent of providing recommendations for establishing and supporting specific core structures, functions, and processes for federal departments and agencies that support COEs, including DHS.

HSOAC undertook reviews of publicly available information (i.e., information shared on department and agency websites) and materials shared by specific programs (e.g., standard

operating procedures and templates, fact sheets, evaluations, etc.) to determine the mission, objectives, structures, and management and oversight processes of federal COEs, as well as the historical and legal frameworks underpinning the selected COE programs. HSOAC also held open-ended discussions, informed by the document and data reviews, with selected points of contact within OUP, the DHS components, and DHS and other federal program COEs (Table S.1). These discussions were held during in-person site visits with 30 DHS COE participants and during virtual sessions with 22 DHS COE participants, 12 DHS stakeholders, and 24 participants representing other federal programs. Through qualitative analysis of the data collected, HSOAC identified lessons learned and best practices and made recommendations for federal departments and agencies that support COE programs, including OUP.

**TABLE S.1**  
**Federal Programs Selected for Analysis**

Federal Agency or Department	COE or COE Program
Centers for Disease Control and Prevention (CDC)	Prevention Research Centers (PRC) BOLD Public Health Programs*
Department of Energy (DOE)	Energy Frontier Research Centers (EFRC)
Department of Health and Human Services (HHS)	HRSA COEs* SAMHSA COE on Social Media and Mental Wellbeing
Federal Aviation Administration (FAA)	Air Transportation COEs*
National Institutes of Health (NIH)	Maternal Health Research COEs* NCI Telehealth Research Centers of Excellence (TRACE) NHGRI Centers of Excellence in ELSI Research (CEER)* NIMHD Specialized COEs on Minority Health and Health Disparities
National Institute of Justice (NIJ)	Forensic Technology Center of Excellence (FTCOE)*
National Institute of Standards and Technology (NIST)	Advanced Materials COE* Community Resilience COE*
National Oceanic and Atmospheric Administration (NOAA)	NOAA Research Labs* NOAA Cooperative Institutes (CIs)* NOAA Sea Grant*
National Science Foundation (NSF)	National Artificial Intelligence (AI) Research Institutes* Cyberinfrastructure Centers of Excellence (CI CoEs) Cybersecurity Center of Excellence (CCoE)*
U.S. Army	University Affiliated Research Centers (UARCs)*
U.S. Navy	UARCs

NOTE: COEs or COE programs marked with an asterisk (\*) indicate that personnel from those organizations participated in interviews. Acronym definitions: BOLD = Building Our Largest Dementia; HRSA = Health Resources and Services Administration; SAMHSA = Substance Abuse and Mental Health Services Administration; NCI = National Cancer Institute; NHGRI = National Human Genome Research Institute; NIMHD = National Institute on Minority Health and Health Disparities.

## Key Findings

### DHS COE insights

- The direct relationship between DHS stakeholders and OUP program managers impacted the success of the COEs.
- COEs effectivity and function were adversely impacted by unpredictable funding amounts and timing as well as by difficulties with the contracting process.
- COE participants focused predominantly on the OUP-mandated annual evaluation process and project evaluations and believed there was room for improvement.
- DHS stakeholders reported project evaluations as a friction point in their work conducted with COEs.
- Both COE participants and DHS stakeholders raised issues related to DHS's privacy and compliance processes.
- COEs shared an overall balanced perspective on technical and nontechnical outcomes, though participants from emeritus COEs tended to be more positive.
- DHS stakeholders expressed mixed perceptions on technical outcomes resulting from COE research, including a concern about operational utility.
- Emeritus COEs shared how the loss of DHS funding upon transition to emeritus status adversely impacts center capability and continuity.
- The challenges associated with becoming emeritus are further compounded with losses related to program manager support and DHS component relationships.

### Other federal program insights

- Successful COEs have resulted in positive outcomes for the federal departments and agencies that support them by being a vehicle for research and development.
- Two key characteristics for facilitating COE success were close collaboration between the federal program and COE and funding support for the COE from other sources.
- Federal programs overwhelmingly prefer cooperative agreements for COEs due to the flexibility and structure of these funding mechanisms.
- Some federal programs employ a combination of funding mechanisms or earmarked funds for key institutional needs such as infrastructure or administrative support, but the timing of funding presents challenges for the federal program and the COEs.
- Research collaboration, partnerships, and external funding facilitate federal program COE success, but participants also shared characteristics perceived as hindering productive engagement.
- Varied center duration by federal program results in a range of impacts on COEs, including increased administrative ease and agility, more established relationships, and increased stability for longer duration COEs (i.e., beyond ten years) and increased flexibility and opportunities to evolve for shorter duration centers (i.e., less than ten years).

- Continual renewals of a COE enable the formation of enduring partnerships that are crucial to research success; however, continually-renewed COEs may develop an expertise or infrastructure advantage, resulting in incumbent researchers or institutions being repeatedly selected if a competition is held.

## Recommendations for All Federal Programs

To facilitate stronger outcomes and strengthen research partnerships, we recommend that federal programs should:

- identify and mitigate misalignment between the government and university-based COEs, such as differences in funding cycles, reporting requirements, and research protection and compliance reviews;
- recognize agency and COE diversity and consider tailored criteria to more effectively evaluate COEs;<sup>1</sup>
- encourage and facilitate more robust and transparent engagement between internal department or agency organizations and COEs by bolstering communication efforts and making them less personality dependent;
- develop roles and processes to ensure clear, consistent application of standards and policies across their COEs; and
- build infrastructure and processes to preserve as much intellectual capital from COEs as possible by encouraging a talent pipeline, creating centralized knowledge repositories, and developing and supporting a community of scholars.

We also recommend that DHS should address the specific challenges related to transitioning to emeritus status, a process specific to the department's COEs.

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<sup>1</sup> This recommendation is not inconsistent with a tailored evaluation of COEs. There are common elements (e.g., programmatic oversight that includes financial, performance, and schedule adherence), which are necessary for any program. The tailoring could be accomplished via customized metrics, timing and types of interactions, formality of reporting, etc.



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# Introduction

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Office of University Programs (OUP) is charged with providing streamlined “access to the expertise of the nation’s colleges and universities to address pressing homeland security needs” (OUP, 2023). To fulfill its mission, OUP oversees and supports three programs: the DHS Centers of Excellence (COEs), the Minority Serving Institutions (MSI) Program, and Workforce and Professional Development Initiatives. As of January 2024, the DHS COEs comprise eight active COEs and twelve emeritus COEs.<sup>1</sup> The DHS COEs identify emerging trends and pursue ground-breaking research in support of the Homeland Security Enterprise (OUP, 2023), and they help train homeland security experts (S&T, 2023). More specifically, “the COEs are designed to (a) work with and complement DHS research and development programs, including federal laboratories’ homeland security research; (b) take advantage of other related federally-sponsored research; and (c) provide outcomes useful to federal, state, and local governments, private sector, and international partners” (S&T, 2023). DHS COEs are expected to leverage public and private networks to provide services to DHS components, assist in research and development capabilities, and promote technology transfer, transition, and commercialization (S&T, 2023).

In September 2022, S&T engaged the Homeland Security Operational Analysis Center (HSOAC) to assist OUP in determining the core functions needed to support current and future COEs and to streamline business processes through several related tasks of the DHS COEs Program Analysis project. More specifically, S&T engaged HSOAC to perform an independent study to assess the structures and functions of COEs, including the competition and transition processes, as well as the relationships among active and emeritus COEs. HSOAC was also tasked with identifying and reviewing similar programs within other federal government organizations. This report presents the methodology for and the results of the project. Based on the completed analysis, the study also provides key findings related to the development, structure, and functions of COEs supported by federal government departments and agencies, as well as recommendations for establishing and supporting specific core

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<sup>1</sup> OUP has two categories of COEs: active and emeritus. All DHS COEs start as active with a defined duration (i.e., five or ten years), and initial guaranteed funding for that duration. At the end of this period, DHS no longer provides a guaranteed funding stream, and the COE is expected to become self-sustaining. These COEs are referred to as emeritus.

structures, functions, and processes for OUP's program and centers. These recommendations are intended to enhance the structure and function of the COE program. The findings should be of interest to S&T leadership and OUP management, as well as to the management and leadership of other federal COE programs and Public-Academic research partnerships.

## Study Scope and Limitations

The purpose of this study was to assist OUP in determining the core functions needed to support current and future federal COEs and to provide recommendations for facilitating stronger outcomes and strengthening research partnerships with academia through DHS' COEs. Consequently, the study was scoped to examine the structures and functions of federal COEs with particular focus on COEs supported by DHS.

Although we had a high rate of engagement from participant outreach related to DHS COEs, our methodological technique for identifying relevant stakeholders for interviews relied on input from the COEs and from OUP, which possibly limited broader stakeholder engagement. We could not identify potential DHS stakeholder participants without COE and OUP input, however, as there are no roles or positions within DHS components that are designated as responsible for interacting with the COEs. Furthermore, many COE participants did not have suggested contacts because DHS stakeholders with whom they have worked have since left DHS, or the participants were from emeritus COEs who no longer have active contacts within DHS components.

Despite these challenges, we sought to ensure that the DHS stakeholder experiences were representative. For one, we reviewed OUP and COE documents to determine which DHS components were the most aligned with COEs (i.e., the COEs' research supports specific DHS component missions), and we used network analysis to identify which DHS components had the highest levels of engagement with COEs.<sup>2</sup> The DHS components represented in this study have collectively worked with all COEs, and we engaged at least one DHS component with which each COE has worked. Finally, the DHS stakeholders we engaged presented varied experiences. We heard a range of perspectives—both positive and negative—on DHS component engagement with COEs.

Though this study's central focus is an analysis of federally-sponsored COEs, it situates that analysis within the broader context of research partnerships. Thus, as part of the study scope, we provide a brief overview of the federal government's motivations for establishing research partnerships and the potential advantages and disadvantages of research partnerships in general. We also present the structure, activities, and functions of COEs as a specific type of research partnership. Our review of COE and COE-like programs within other fed-

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<sup>2</sup> We completed a network analysis of COE and DHS component engagement as part of our examination of COE structures, functions, processes. We also used the network analysis in our site visit selection process. A visualization of the network analysis is included in Appendix B.

eral government organizations is not meant to be a comprehensive review of those programs on par with our analysis of the DHS COEs. But through our selection process, the federal programs included in the study represent a range of characteristics relevant to understanding the structures, functions, and processes of COEs as research partnerships between the federal government and universities and as such, they provide example structures, functions, and processes from other federally-sponsored COEs that OUP might consider.

Finally, we note that DHS consists of 16 different operational and support components, making the DHS COE program distinct from other federally-sponsored programs. DHS COEs may engage with several components and other offices within DHS as research partners, which have their own legal authorities, missions, and capabilities. The federal program COEs selected for review in this study may engage a range of partners, but their core functions, structures, and processes are developed and executed in conjunction with one federal department or agency. Although these limitations place boundaries on the scope of the work completed, the study's findings should be of interest to OUP management, S&T leadership, and DHS COE personnel specifically, as well as to management and leadership of other federal COE programs and Public-Academic research partnerships.

## Background on Research Partnerships

When the Homeland Security Act authorized the creation of DHS COEs in 2002, it built on a long history of U.S. government funded research for the public good and recognized the central role that academic institutions play in the research ecosystem. For example, the establishment of the National Academy of Sciences in 1863 created independent organization charged with providing “scientific analysis and advice to the United States government and to help plan new federal agencies, the capabilities of which would be needed by the government” (Cicerone, 2013; Dupree, 1986). During the technological revolution of the late nineteenth and early twentieth centuries, the government's engagement with scientific research grew dramatically. In particular, the numerous programs that the U.S. government sponsored in World War II demonstrated the critical role of scientific advancement in both national defense and the nation's prosperity. As the war drew to a close, President Roosevelt commissioned the director of the Office for Scientific Research and Development, Vannevar Bush, to draft a report on a national science policy for peacetime. The report argued forcefully for U.S. government investment in science. As Bush described, “There are areas of science in which the public interest is acute but which are likely to be cultivated inadequately if left without more support than will come from private sources. These areas ... should be advanced by active Government support” (Bush, 1945; Kevles, 1977). To achieve his vision of a nation whose health, prosperity, and safety were bettered through scientific research, Bush (1945) called for universities to work as a “team” with government and industry to deliver advancements that would foster economic prosperity, improve health, and provide for national defense.

Though the U.S. government has invested heavily in science, particularly through federal agencies like the National Institutes of Health (NIH), National Science Foundation (NSF),

and Department of Energy (DOE), the government's engagement with academic research has evolved to focus on the creation of topically-focused partnerships and research centers that promote research applications and best practices as well as foundational research (Chubin et al., 2010; National Academies of Sciences, Engineering, and Medicine, 1996). One prominent example of the practical research outcomes that these partnerships can yield is the Advanced Research Projects Agency Network, an academic-government partnership managed by the Defense Advanced Research Projects Agency, which developed the protocols underlying the modern internet. While these Public-Academic partnerships help to leverage academic expertise for the public good, critics observe that, rather than focusing on advancing basic science and the advancement of knowledge, partnerships encourage universities to engage in applied research that blurs the boundary between commercial or consulting practice and traditional research (Bok, 2004). Despite the blurred boundaries around universities' roles in research and development, federal government support has become a particularly important source for universities as overall state support for universities has diminished over time (American Association for the Advancement of Science, 2022; Feller, 2004).

In addition to providing universities with public funding to engage in research that is in the public interest, these partnerships provide other advantages that can make them particularly effective at addressing policy challenges. In the box, we summarize the key advantages of research partnerships generally, broadly aligning with either cost-economizing or

## **Advantages and Disadvantages of Research Partnerships**

### **Advantages**

- Research and development (R&D) cost sharing
- Reduction of R&D duplication, research synergies
- Risk sharing, uncertainty reduction
- Knowledge sharing
- Access to complementary resources and skills
- More effective deployment of extant resources and further development of resource base
- Promotion of technical standards
- Easier access to finance
- Strategic flexibility, market access, and the creation of investment options
- Market power (e.g., co-opting competition)

### **Disadvantages**

- Lack of compatibility with core firm interests
- Limited parallel approaches to uncertain technological problems
- Competition policy concerns (e.g., blocking competition and new market entry)
- If subsidized, moral hazard concern (i.e., doubts raised about the use of taxpayer money)

SOURCE: Adapted from Hemphill and Vonortas, 2003.



strategic-positioning goals. We also present potential disadvantages that should be considered when establishing research partnerships.

Because of the numerous advantages that they provide, research partnerships have become commonplace in both the commercial and public sectors. Firms are able to use joint ventures and strategic alliances to partner on specific operational areas, such as new product development and process improvement, under more flexible terms than simple contracting allows. Within the public sector, cross-sectoral partnerships offer mechanisms to engage in complex ongoing collaborations. Public-private partnerships are used by governments to engage commercial partners to provide a service, construct large infrastructure projects, or deliver a good. Similarly, Public-Academic partnerships can take the form of facilities-focused partnerships or term-based awards for the operation of research centers or centers of excellence. While there is a substantial literature on public-private partnerships and the advantages and inefficiencies that they produce in different contexts, there is considerably less analysis of Public-Academic partnerships that are focused on specific topic areas rather than on the general provision of government funding for research. We reviewed this more limited literature on management of research partnerships to provide a basic context for our work and to ground our analyses and to help to identify key themes in the organization and operation of successful COEs.

## Centers of Excellence

COEs are teams with a specialized, often multidisciplinary, expertise, that are focused on the application of research and to solve issues in specific domains. Historically, the information technology industry used COEs to facilitate the creation of hubs for knowledge sharing and building and for enhancing capabilities. However, COEs as a concept have evolved, and they are now applied in numerous research and operational contexts outside of information technology (Manyazewal et al., 2022).

COEs perform a wide range of functions in support of their overall missions. In his assessment of nuclear security COEs, Heyes (2012) identified five types of core COE activities:

- technical and scientific
- educational
- engagement with a wide range of topics related to the center's focus
- research and development or commercialization
- raising awareness.

A RAND study provides a complementary perspective on the functions of a COE that was focused on maritime responses in the Great Lakes (Wirth et al., 2021). In this context, the COE served to bridge a multidisciplinary group of experts and maritime domains. Researchers identified three core research functions that the COE could serve: integration, gap-filling, and translation. Integration of knowledge and expertise was a significant function that the COE could provide, as it would be difficult for responding agencies to stay abreast of the

multidisciplinary research on oil spill response without COE support. Through gap-filling, the COE could identify research questions in knowledge areas that have been understudied, hampering agencies' response. Lastly, the COE could provide translation of scientific and engineering research so that those on the front lines could effectively employ them (Wirth et al., 2021).

In these and many other contexts, federally-funded COEs within universities underpin productive and mutually beneficial partnerships that deliver on the government's interest in cultivating science for the public good. These COEs fulfill the vision that Bush (1945) articulated nearly 80 years ago of universities, industry, and the government working as a team to deliver advancements in key areas. By supporting these collaborations, the federal government provides an important source of funding to universities and helps them channel their expertise into advancements that foster economic prosperity, improve health, and provide for national defense. Additionally, by providing sites for a wide range of activities including knowledge exchange, outreach, capability enhancement, and training, COEs can be effective at addressing complex policy challenges that are important to the national interest.

## Organization of This Report

Following this introduction and background on research partnerships, Chapter 2 presents the study's methodology, summarizing our approach to reviewing the relevant structures, functions, and processes of the COEs and OUP, interviewing personnel from all COEs and relevant DHS stakeholders, and analyzing the collected data. Chapter 2 also describes our process for identifying and reviewing other federal programs, interviewing personnel from those programs, and analyzing the interview data. Chapter 3 presents the findings from our analysis of the current structure and function of OUP's COEs. We also document our findings on the DHS COEs, including key insights from interviews with COE personnel and DHS stakeholders. Chapter 4 details the federal program review findings, including brief overviews of each program that highlight its main research focus, funding mechanisms, and duration. Additionally, the chapter presents key insights gathered from interviews with federal program participants. In Chapter 5, we offer recommendations for establishing and supporting appropriate structures, functions, and processes to support the research partnership established by federal departments and agencies with their programs and centers. We developed these recommendations from the analysis documented in Chapters 3 and 4 to provide federal departments and agencies, including DHS S&T, with potential actions areas for facilitating stronger outcomes and strengthening these research partnerships. The appendices document supplementary materials for the DHS COE review (Appendix A) and the federal programs review (Appendix B). These materials include background findings for each DHS COE and federal program, selection processes for conducting site visits and identifying federal programs, and methodological details for the interview protocols, participant engagement, and qualitative data analysis approaches.

# Methodology

In this chapter, we summarize the methodology used to document and analyze the relevant structures, functions, and processes of the DHS COEs and OUP, as well as our approach to identifying and analyzing other federally-sponsored COEs. The methodology included document review, identification of sites for in-person visits, identification of other federal programs, and interview sessions that engaged 88 participants from OUP, DHS COEs, DHS stakeholders, and other federal programs. More detailed descriptions of our methods for identifying COE factors for analysis, selecting DHS COEs for site visits, developing discussion protocols, engaging interview participants, and analyzing data are in Appendix A. Appendix A also contains summary descriptions of each DHS COE. Appendix B contains more detailed descriptions of the selected federal programs and our methods for program selection, discussion protocol development, participant engagement, and data analysis.

## Analysis of OUP and DHS COEs

To establish foundational knowledge of OUP and the DHS COEs, we undertook a document review of publicly available information (i.e., information shared on OUP's and the COEs' websites) and materials shared by OUP and the COEs (e.g., standard operating procedures and templates, fact sheets, briefings, and evaluation reports). More specifically, we reviewed the mission, objectives, structures, and management and oversight processes of OUP and the COEs, as well as the historical and legal frameworks underpinning OUP's COE program. We also used OUP's COE assessment categories to identify a range of assessment metrics, approaches, and output products. With the information gathered from the document review, we created a summary table of the COEs (see Appendix A), which helped us identify sites for in-person visits and any remaining knowledge gaps. The summaries also helped us develop the discussion protocols for interviews with COE personnel, DHS stakeholders, and OUP staff. A literature review of academic and public policy studies on the management of COEs was used to guide the development of interview protocols and to identify key themes for our discussions.

After our document review was completed, we identified personnel within each COE for engagement. We reached out to a total of 61 potential participants based on their current or former leadership roles within the COEs, and our outreach yielded 52 participants from across all 20 COEs. We engaged 30 COE participants during in-person site visits to select

centers and 22 participants during virtual sessions. We also sought engagement with DHS stakeholders who had worked or are working with COEs to hear their perspectives on COE structures, functions, processes, and related outcomes. We reached out to 13 potential participants from seven DHS components,<sup>1</sup> and spoke with 12 participants total in 11 virtual sessions. Lastly, we spoke to OUP staff to gather additional background information to fill the gaps in our knowledge of OUP and its COE program.

For the COE and DHS stakeholder participant interviews, we employed an emergent coding technique (Elliott, 2018)—a qualitative data analysis method that facilitated the identification, examination, and interpretation of patterns and themes—to analyze the interview data. Our analysis of the data from both COE participants and DHS stakeholders focused on evaluation processes and experiences, funding mechanism types and structures, engagement types, structures, and processes, and COE outcomes. In addition, we also examined textual data on COE transition from active to emeritus status from the COE interviews. We did not include the information gathered in the OUP staff interviews in this data analysis, as those sessions were for background only.

## Analysis of Other Federal Programs

In conjunction with OUP leadership, we identified 36 distinct programs across 19 federal departments and agencies for consideration. These programs were selected based on both their alignment with the objectives and structures identified in our background research on university and government research partnerships and interest in identifying example structures, functions, and processes of federally-sponsored COEs. After initial identification, we gathered information on each program, including their missions and objectives, brief histories of their creation, and any related legal and/or Congressional foundations to their development and operation. To ensure we selected programs that represented a range of characteristics relevant to our study, we developed a matrix of factors for evaluating their potential inclusion. Through the matrix selection process, we narrowed the number to 21 federal programs across 11 federal departments and agencies (Table 2.1).

In addition to our review of publicly available materials for the selected programs, we identified personnel within each organization for engagement. We reached out to 71 potential participants, based on their current or former leadership roles within the 21 identified federal programs and affiliated centers. Our outreach yielded 24 participants from 15 distinct programs, whom we engaged in virtual interview sessions.<sup>2</sup> Once the interviews were completed,

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<sup>1</sup> DHS stakeholders were working in the following components when they engaged with the DHS COEs: U.S. Customs and Border Protection (CBP), Cybersecurity and Infrastructure Security Agency (CISA), U.S. Immigration and Customs Enforcement (ICE), Office of Strategy, Policy, and Plans, S&T (outside of OUP), U.S. Coast Guard (USCG), and U.S. Secret Service (USSS).

<sup>2</sup> Most participants (19 of 24) participated in one interview session. Five participants participated in a second session, upon the team's request to solicit additional information.

**TABLE 2.1**  
**Federal Programs Selected for Analysis**

Federal Agency or Department	COE or COE Program
Centers for Disease Control and Prevention (CDC)	Prevention Research Centers (PRC) BOLD Public Health Programs*
Department of Energy (DOE)	Energy Frontier Research Centers (EFRC)
Department of Health and Human Services (HHS)	HRSA COEs* SAMHSA COE on Social Media and Mental Wellbeing
Federal Aviation Administration (FAA)	Air Transportation COEs*
National Institutes of Health (NIH)	Maternal Health Research COEs* NCI Telehealth Research Centers of Excellence (TRACE) NHGRI Centers of Excellence in ELSI Research (CEER)* NIMHD Specialized COEs on Minority Health and Health Disparities
National Institute of Justice (NIJ)	Forensic Technology Center of Excellence (FTCOE)*
National Institute of Standards and Technology (NIST)	Advanced Materials COE* Community Resilience COE*
National Oceanic and Atmospheric Administration (NOAA)	NOAA Research Labs* NOAA Cooperative Institutes (CIs)* NOAA Sea Grant*
National Science Foundation (NSF)	National AI Research Institutes* Cyberinfrastructure Centers of Excellence (CI COEs) Cybersecurity Center of Excellence (CCoE)*
U.S. Army	University Affiliated Research Centers (UARCs)*
U.S. Navy	UARCs

NOTE: COEs or COE programs marked with an asterisk (\*) indicate that personnel from those organizations participated in interviews. Acronym definitions: BOLD = Building Our Largest Dementia; HRSA = Health Resources and Services Administration; SAMHSA = Substance Abuse and Mental Health Services Administration; NCI = National Cancer Institute; NHGRI = National Human Genome Research Institute; NIMHD = National Institute on Minority Health and Health Disparities.

we again employed an emergent coding technique to analyze the interview data. Our analysis of the data focused on:

- evaluation processes and experiences,
- funding sources, mechanisms, and schedules,
- center duration,
- center outcomes, and
- engagement types, structures, and processes.

Within these themes, we sought to understand each program's decisionmaking philosophies for selecting specific funding mechanisms and outcomes of allowing center renewals compared with recompetition or sunseting. We also investigated how research topics and relationships may have evolved through renewal and/or recompetition opportunities for COEs.



## DHS Centers of Excellence Analysis

As a key element of this study, we analyzed the current structure and function of OUP's COEs, including evaluation and transition processes. Using the methodology summarized in Chapter 2, we reviewed the relevant structures, functions, and processes of the COEs and OUP, interviewed personnel from all COEs and relevant DHS stakeholders, and analyzed the data collected from those interviews. This chapter presents the findings of that review and analysis. Descriptions of each DHS COE, highlighting its main research focus, status (i.e., active or emeritus), and alignment between the COE's research focus and specific DHS component missions are in Appendix A.

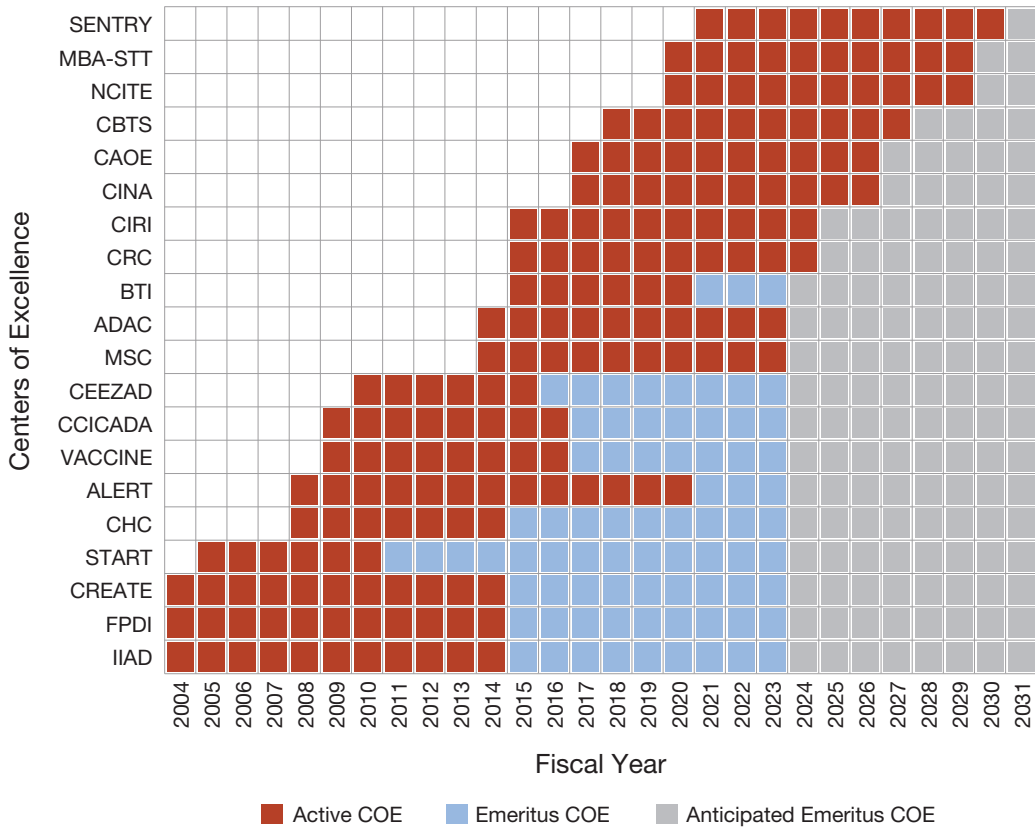
### Overview of DHS COEs

OUP operates COEs with a range of goals. Most COEs engage in applied research across a diverse set of subject areas, in support of individual components of DHS. Some COEs also provide technical assistance, product and workforce development, education, and training support. The range activities are often driven by component needs, and COE performances are evaluated within this context. OUP has a mandate to concurrently operate ten active COEs at any given time, with some flexibility for the startup time of new COEs. All active COEs are funded through cooperative agreements with opportunities for supplemental funding provided through basic ordering agreements (BOAs). Emeritus COEs no longer have cooperative agreements in place but have access to BOAs. As of January 2024, there are eight active COEs and 12 emeritus, two of which transitioned from active to emeritus status in fiscal year 2022. Historically, the award length for COEs has varied, but since 2014, the expectation is that a COE will operate under a cooperative agreement for ten years before transitioning to emeritus status. Figure 3.1 presents a timeline documenting each COE's active and emeritus status. As of January 2024, there are more emeritus COEs than active COEs, and the share of emeritus COEs relative to active COEs will continue to grow as centers transition under existing structures and processes.

### Insights from COE and DHS Stakeholder Interviews

This section presents the findings from our targeted data analysis of the DHS COE and DHS stakeholder interviews. The data were collected from 64 participants during 28 COE

**FIGURE 3.1**  
**Active and Emeritus Status Timeline of OUP COEs**



NOTE: Acronym definitions: SENTRY = Soft-Target Engineering to Neutralize the Threat Reality; MBA-STT = Masters of Business Administration in Security Technology Transition; NCITE = National Counterterrorism Innovation, Technology, and Education Center; CBTS = Cross-Border Threat Screening and Supply Chain Defense; CAOAE = Center for Accelerating Operational Efficiency; CINA = Criminal Investigations and Network Analysis Center; CIRI = Critical Infrastructure Resilience Institute; BTI = Borders, Trade, and Immigration Institute; ADAC = Arctic Domain Awareness Center; MSC = Maritime Security Center; CEEZAD = Center for Excellence for Emerging and Zoonotic Animal Diseases; CCICADA = Command, Control, and Interoperability Center for Advanced Data Analysis; VACCINE = Visual Analytics for Command, Control, and Interoperability Environments; ALERT = Awareness and Localization of Explosives-Related Threats; CHC = Coastal Hazards Center; START = National Consortium for the Study of Terrorism and Responses to Terrorism; CREATE = Center for Risk and Economic Analysis of Threats and Emergencies; FPD = Food Protection and Defense Institute; IIAD = Institute for Infectious Animal Diseases.

interview sessions and 11 DHS stakeholder interview sessions. These interviews were not for attribution, but where appropriate, we include information on the interviewee's affiliation generally (e.g., with a COE or DHS component, with an active or emeritus COE). In the insights discussed below, active and emeritus COE feedback are described together when their perspectives were balanced. Findings also note any instances in which perspectives specifically related to either active or emeritus COEs.

We sought to collect insights from our DHS and COE interviews that were related to existing structures, functions, and processes in place. Insights seek to identify key areas for



strengthening OUP and the COEs such as process improvements, refinements to incentive structures, and changes to management and oversight practices. This baseline set of insights then informs and facilitates the comparative analysis of Federal Program COEs in Chapter 4. The ultimate goal of this exercise is to support the development of recommendations for enhancing structure, function, and long-term management of the DHS COE program.

After coding, discussing, and analyzing the interviews, the major process topics identified in our analysis centered on the strengths and challenges related to COE engagement with OUP and DHS stakeholders, funding processes, center evaluation processes, privacy and compliance evaluation processes, COE technical and nontechnical outcomes. Major function and structure outcomes identified included a focus on funding structures and the use of the emeritus model. Because funding processes and funding structure discussions overlapped, we have grouped this insight area. Collectively this left us with the following seven insight areas: *Engagement, Funding, Evaluation, Privacy and Compliance, COE outcomes*, and finally, *The Transition to Emeritus Status*.

## Engagement

**Participants in 19 COE interview sessions shared varied experiences with developing and maintaining relationships between COEs and DHS stakeholders.** Participants in 12 sessions shared examples of positive engagement, including working with stakeholders in DHS components who help COEs identify operational problems and potential users of research products. Respondents also noted benefits of early and direct communication with personnel in DHS components rather than navigating communication through S&T. However, participants in 11 COE sessions expressed difficulty engaging directly with components. Several respondents mentioned that components do not yet fully embrace or understand the value of COEs, and that relationship building between the COE and DHS components is limited due to the high turnover and busy schedules of DHS personnel. In one COE session, a participant shared that they spend time reteaching DHS employees and redoing work because the research generated by COEs is not broadly shared within or across components. A significant difficulty that COE participants reported was the misaligned expectations between DHS and universities, especially with respect to balancing the relevance of research to components with contributions that academic researchers can make within peer-reviewed scientific communities. Specifically, a differing perspective on technological merit, change in program manager, and/or S&T imperatives led to COEs needing to adapt their research approaches and directions for DHS projects.

**COE participants also shared varied engagement experiences with DHS and OUP.** Participants in all but one COE session shared their experiences with DHS generally and OUP specifically, and in 14 interview sessions, COE respondents reported positive relationships with OUP. OUP program managers described as thoughtful, committed, and effective communicators were considered by COE participants to be instrumental in helping a COE achieve success. Despite these positive experiences, participants in 20 COE sessions

also reported difficulties in their engagement with DHS and OUP. Difficulties arose due to a variety of reasons, including:

- OUP program managers inconsistently applying standards and policies across the COEs, and/or within a COE due to program manager turnover;
- COEs experiencing high turnover in assigned OUP program managers during their active period, resulting in COEs needing to adapt to the new program manager's preferences;
- OUP program managers serving as the gatekeepers of connections to DHS components, which creates challenges if the program manager makes insufficient connections among the COE, components, and other potential partners; and
- encountering a general misalignment in research vision and expectations between academic researchers and DHS stakeholders.

**DHS stakeholders also shared varied experiences in developing and maintaining relationships with DHS COEs.** DHS stakeholders in five sessions noted that they forged an initial connection directly with COE leadership, while participants in four sessions described connecting with a COE through a DHS colleague already working with the COE. Only one participant noted explicitly that their connection was developed through an OUP program manager, further demonstrating the lack of connections that OUP program managers are making between DHS components and COEs. Participants in five interview sessions shared challenges in maintaining relationships with the COEs, such as difficulty in connecting the component to the COE due to unclear component processes and roles, a lack of sufficient and designated personnel within the components for engaging COEs, and uncertainty about points of contacts within the COEs, OUP, and S&T with whom DHS stakeholders might engage.

**DHS stakeholders shared characteristics they found effective and ineffective for productive engagement with the COEs.** The direct relationship between DHS components and COEs was discussed in nine DHS stakeholder sessions, and participants in eight of these sessions emphasized the importance of developing strong relationships with COE leadership. Respondents noted that stronger engagements were a result of having highly involved COE directors, multiple points of contact within the COE, and transparency in COE roles and responsibilities. One DHS stakeholder shared that their partnership with a COE was particularly effective because the COE felt like an extension of the component's team. Stakeholder participants reflected on the absence of these factors driving strong relationships in four sessions. The resulting, ineffective engagement experiences between a DHS component and COE led to negative outcomes, including poor working relationships, weak connections, and—as COEs also reported—a misalignment between DHS component needs and university capabilities.

**The direct relationship between DHS stakeholders and OUP program managers was also discussed in nine DHS stakeholder sessions.** The program managers' reported levels of engagement varied, with participants in two sessions reporting little to no contact with OUP program managers, and participants in two other sessions describing a high level of involvement with OUP program managers. There were two sessions in which respondents noted that

the relationship goes both ways, and one session in which a respondent expressed that the OUP program manager should be the focal point for engagement.

## Funding

**COE participants identified inconsistency in funding amount and timing as having negative impacts on COE function.** Participants in two thirds of COE interviews (19 sessions) discussed the cooperative agreements as the primary funding source for active COEs. Respondents in all but two of these sessions focused heavily on challenges they have encountered with this funding mechanism. Participants noted that inconsistencies in the amount and arrival timing of funds negatively impacted the COEs. COE participants explained these inconsistencies inhibit their ability to plan budgets, staff centers adequately, and execute productive research. In one session, participants noted that delayed disbursement of funding results in losing research talent, particularly during the summer when student researchers take opportunities elsewhere. Participants in two other sessions explained that the delayed disbursement can also delay projects, impacting what should be the most productive research season of the academic year. A participant suggested that OUP should communicate funding timeline expectations up front (e.g., cooperative agreement funds might arrive late), and that universities may be required to cover gaps in COE funding until disbursement. In nine COE sessions, respondents shared that they have received university funding support, which at times helped to bridge DHS funding gaps.

**COE participants also identified the contracting process as having the potential to negatively impact COE function.** COE participants perceived the contracting process as poorly defined and a task that universities are not resourced to undertake. Furthermore, administrative support funding through the cooperative agreement was considered as insufficient. One COE participant noted that their university is responsible for managing numerous subawards, and the regulatory documents required of them are considerable, creating an administrative burden. Once funding is received, participants in several sessions also reported barriers to using funds for specific budget lines, including for travel and hiring staff into coordinator roles.

**Despite these challenges, participants in seven COE sessions shared benefits of the cooperative agreement funding mechanism.** One COE experienced a smooth funding process, and another participant noted an aggressive growth in funding over a five-year period, which was seen as positive. The longer timeline associated with cooperative agreements was also considered beneficial for COEs because it allows them to build both the administrative and intellectual infrastructure necessary for center success. Finally, although many participants felt that funding for administrative support was insufficient, several other COE participants noted that having funding allocated directly for administrative support was an advantage of cooperative agreements—though a feature that is not included in BOAs.

The BOA funding mechanism can serve as an additional source of funding for active COEs and as a primary avenue of funding from DHS components for emeritus COEs. **Participants from both active and emeritus centers reflected on their use of BOAs, identifying**

**advantages and disadvantages.** Advantages of BOAs include the alignment of funding disbursement with project start dates, opportunities to work with different DHS components, and support for emeritus COEs to continue research with DHS stakeholders. Participants from three active COE sessions also noted disadvantages, including BOA use for federal projects only, a lack of funding for educational activities, and the absence of administrative support. Additionally, the reporting requirements, regulations, and stipulations of BOA contracts were considered undesirable features. Participants from six emeritus COE sessions also shared similar disadvantages, including the stringent contract terms that can at times delay projects. One emeritus COE participant shared that researchers would rather not use BOAs because of their restrictive regulations. Finally, participants from two emeritus COE sessions shared that BOAs do not support full-time staff (limiting researchers to postdoctoral scientists), and they do not support travel activities for engaging with stakeholders, which can undermine COE productivity and success. One COE participant acknowledged the difficulties for emeritus COEs in competing with active COEs for work, as active COEs already have base funding and a greater presence within DHS components.

**Participants from 15 COE sessions shared insights into their experiences seeking and receiving funding from outside of DHS.** One participant shared that, as an applicant, being a COE was helpful for confirming qualifications to other federal departments and agencies. A participant from a different COE noted that obtaining interagency or external funds was beneficial to the center. COEs' examples of other government funding sources include—but are not limited to—funds from state governments and federal departments and agencies, such as the Department of Defense (DoD), HHS, CDC, NOAA, and NSF. For one COE participant, external funding was especially helpful for obtaining supplemental support for center functions and activities that DHS funding could not fully support. Although less frequently discussed in the COE interview sessions, some participants cited awards from industry and other COEs' notices of funding opportunities as additional funding sources. While one participant did not believe COEs ran solicitations effectively, participants in another session acknowledged that this funding mechanism is an additional funding avenue for emeritus COEs. Limited feedback was provided regarding industry funding.

## Evaluation

**When discussing evaluation activities, COE participants focused predominantly on the OUP-mandated annual evaluation process and project evaluations.** Participants in 14 COE sessions provided balanced feedback regarding the annual evaluation, with advantages of this process including opportunities for COEs to meet and engage with other universities, DHS personnel, and stakeholders. The annual meetings were cited as networking opportunities for COEs to develop relationships and build collaborations. However, participants in seven COE sessions also reported disadvantages to the annual evaluation, including COEs' experiences that OUP does not always invite individuals appropriate for making connections to the annual meetings. It is also unclear how OUP assesses the content within COEs' evaluation reports, with multiple COEs believing the report is a "check-the-box" exercise. A final disadvantage

of the annual evaluation is the duplicated efforts with university reporting requirements; the lack of coordination between OUP's evaluation processes and requirements and university evaluation processes and requirements exerts an unnecessary strain on COE administration.

**COE participants expressed stronger negative feedback regarding the project evaluations.** While the project evaluation process is helpful for general portfolio management, participants in nine COE sessions described challenges associated with the process, including how the requirements could at times be excessive. Frequent DHS component oversight resulted in projects changing direction midproject or being canceled. COE participants explained that this experience, in part, is a result of the misaligned definitions of success and innovation between DHS and universities. **DHS stakeholders also reported project evaluations as a friction point in their work conducted with COEs.** While participants in two sessions indicated that they would not make changes to DHS components' opportunities to evaluate COE projects, participants in two other sessions found the project evaluation process to be problematic. Potential improvements identified include better structuring engagement between the DHS component and S&T and developing more effective processes for identifying component needs and defining projects that can address those needs.

## Privacy and Compliance

**Both COE participants and DHS stakeholders raised issues related to DHS's privacy and compliance processes.** Participants in half of the COE sessions (14) discussed DHS privacy and compliance impacts on their COE's ability to conduct research. Experiences were predominantly perceived as negative, with participants in ten sessions sharing challenges experienced when navigating the DHS privacy and compliance requirements. Respondents described DHS's stance on privacy as quite unusual, broad reaching, and inconsistently applied. COE participants shared this stance has had adverse impacts on research, including delayed or canceled projects and a decreasing willingness among COEs and associated universities to seek DHS funding for research efforts. One COE participant shared that prior to recent changes in DHS personnel, they did not experience issues when they were able to use their university's Institutional Review Board, and another noted that some issues seem to have been alleviated since addressing this issue with S&T and agreeing to complete only DHS's Compliance Assurance Program Office (CAPO) review. Several DHS stakeholders also spoke to privacy and compliance issues. Although DHS participants in three sessions noted they do not have challenges with DHS privacy or DHS CAPO due to either the nature of the research or the leading role that the COE takes with privacy issues, participants in two other sessions reported that DHS privacy complex processes and notably high level of interaction resulted in delayed and reshaped projects.

## COE Outcomes

**COEs shared an overall balanced perspective on technical and nontechnical outcomes, though tended to be more positive for emeritus COEs.** Participants in 21 COE sessions

discussed technical transitions, with positive outcomes reported in 13 COE sessions (two thirds of which came from the emeritus COEs). Positive sentiments included examples or transitioned products that serve government and private needs and the ability to produce products that can be licensed and commercialized. COE participants reflected on the importance of having a direct relationship with the component throughout the project, ensuring that end users are identified and consulted from the beginning of a project, and obtaining stakeholder investment and championship. Eleven COE sessions also included discussion of shared negative aspects of technical transitions, and two thirds of these negative comments came from active COEs. COE respondents shared that projects are not always well-connected to the operating environment, making projects either difficult to transition or leading them to be entirely cut. For projects that do get transitioned, one COE participant noted that DHS components have a strong preference for an operationally ready and physical product, whereas knowledge products are less embraced. A general disconnect in expectations was also acknowledged between DHS's preference for products that can be commercialized and university preferences to conduct and publish academic research. Even if technical products were transitioned, COE participants in two sessions shared challenges related to transition outcomes, such as a lack of funds to support the transitioned technology and that the development of a data repository is the university's responsibility. Other issues related to data were also raised in nine COE sessions, with participants in seven of these sessions sharing negative experiences. COEs reported issues with data silos, a lack of data centralization, uncertainty on who controls data, limitations related to the transfer of data between COEs and components, and limitations on COE's use of open-source data (e.g., social media).

**DHS stakeholders expressed mixed perceptions on technical outcomes resulting from COE research.** Stakeholder participants in six sessions reported positive outcomes, while others reported negative outcomes in two sessions or both positive and negative outcomes in three sessions. The perspectives on technical outcomes shared by DHS matched those shared by the COEs. Positive outcomes were based on the COEs' successful understanding of technology gaps, end states, and data, and their ability to subsequently develop a product that components could transition into long-term operational use. Negative outcomes for technical transition were related to COEs not designing their research to address a component's operational functions and needs, thus resulting in final products that lacked value in operational environments. Furthermore, negative outcomes were also linked to products that were potentially valuable, but the COEs and components lacked foresight in how a product will be maintained in terms of cost, infrastructure support, and expertise beyond the research project duration.

**Nontechnical transition experiences were also shared, with a focus on workforce development and educational initiatives.** COEs offered examples of workforce development and educational efforts they led, including internship programs, professional and customized training, degree programs and professional certificates, and workshops. Positive sentiments were shared about workforce development in three emeritus COE sessions and about educational initiatives in twelve total COE sessions. COE respondents emphasized the importance of educating component stakeholders and users, and how broader education is critical for

successful product transition. One respondent believed their COE was making a large impact within its research field through these educational initiatives, and others acknowledged the benefits of exposing students to high-level research universities and the innovation students bring. Despite these successful efforts, participants expressed dissatisfaction about workforce development in four COE sessions and about educational initiatives in eight COE sessions. A notable area of dissatisfaction was the lack of opportunities for COE students to progress into DHS careers. Respondents shared that there is no direct recruitment or hiring pipeline, that students' research experiences do not fit with some components' training protocols, and that ultimately DHS components do not realize the potential talent pool that is built at COEs. One COE participant also explained that workforce development and research efforts are treated separately by OUP, and they believed that these efforts should instead be better integrated. Finally, participants from two emeritus COEs noted that without base funding, such educational activities are not supported. A smaller subset of DHS stakeholder sessions included discussion of workforce development and educational initiatives and suggested that some components are better suited to developing a potential personnel pipeline from COEs. Respondents in four stakeholder interviews found value in student engagement; however, DHS stakeholders in two other sessions were uncertain if the COE students engaged in these initiatives are eventually hired by DHS components.

## COE Transition to Emeritus Status

Participants in 20 COE sessions discussed their experiences with DHS's active-to-emeritus transition process. These sessions included seven active COEs and 14 emeritus COEs, and most of these sessions covered the topic of funding. **Participants in 12 emeritus COE sessions shared how the loss of DHS funding upon transition to emeritus status hurts center capability and continuity.** Respondents noted that the loss of cooperative agreement funding for administrative functions and scientific endeavors cannot be easily replaced with other sources of funding, such through BOAs. Moving to emeritus status resulted in reduced budget planning capability, and COEs reported transitioning to research activities that were focused on short-term, applied tasks. One consequence of this refocus is reduced alignment between research and doctoral and postdoctoral student interests. Respondents questioned how COEs can be expected to achieve long-term sustainment of research teams and expertise without a funding framework like the cooperative agreement. Respondents in eight of the emeritus COE sessions spoke specifically about their difficulties in maintaining staff upon becoming emeritus. The uncertainty of emeritus COEs without base funding is perceived as significantly impacting their long-term success. Participants in these sessions also described a common experience of losing intellectual infrastructure and administrative support, and a sense that DHS lacks awareness of the administrative costs involved in conducting research.

**The perceived funding challenges associated with becoming emeritus are further compounded with losses related to program manager support and DHS component relationships.** In five emeritus COE sessions, participants expressed that transitioning to emeritus

has negatively affected their COE, as OUP program managers no longer formally serve as a conduit to connecting COEs with DHS components. Respondents believe that the removal of this type of support contributes to their center becoming underused by and poorly connected to DHS components. One COE participant shared that having an emeritus status seems to mean that clients perceive the COE as being “closed,” which has been detrimental to their center’s success. Another emeritus COE participant noted that, although building and maintaining connections with components is important for establishing projects, the high turnover of personnel within DHS makes this endeavor difficult—especially after center transition. Participants in seven COE sessions also discussed that their centers felt unsupported as they prepared to transition to emeritus. The transition process was described as uncertain and unclear, and that once transitioned, the emeritus status provided limited value to COEs. Despite this commonly shared experience among emeritus centers, participants from two emeritus COE sessions shared positive experiences related to transitioning. To achieve positive experiences, it was suggested that transition preparation should occur over several years, during which time COEs can specifically target relationships and opportunities for development with OUP support that would serve the COEs after transition. Provision for a “soft” transition through receiving an additional year of funding to complete and migrate projects while maintaining staff was also perceived by COEs as instrumental for a successful transition experience.

## Summary of DHS COEs Analysis

In this chapter, we documented key findings related to engagement between COEs and DHS components; COE funding structures and processes; evaluation, privacy, and compliance processes; COE outcomes; and COE transition to emeritus status.

Among our findings on engagement, COE participants reported varied engagement experiences in developing and maintaining connections and engagement with DHS stakeholders, with perceived misalignment between university capabilities and DHS component needs cited as creating difficulties. However, COE participants also found that OUP program managers who are thoughtful, committed, and effective communicators are instrumental in helping a COE achieve success. DHS stakeholders described similarly varied engagement experiences, noting that direct connections to COE leadership were helpful in establishing relationships, but that ineffective engagement experiences led to negative outcomes, including the continued misalignment between capabilities and needs.

COE participants described the negative impacts from inconsistency in funding amounts and timing and from challenges related to the contracting process on the COEs’ ability to plan budgets, staff centers adequately, and execute productive research. Despite these challenges, COE participants also reported that the cooperative agreement as a funding vehicle benefited COEs by providing them the time and resources to build administrative and intellectual infrastructure. Responses about experiences with their COEs’ use of BOAs also revealed a mix of advantages and disadvantages, but external funding was generally seen as helpful.



We found that COE participants identified annual meetings as important networking opportunities to develop relationships and build collaborations with DHS stakeholders, although COE participants reflected more negatively on the annual center and project evaluations. Some DHS stakeholders likewise identified the project evaluation process as a point of friction. Both COE and DHS stakeholder participants provided negative feedback on DHS privacy and compliance processes, with COE participants sharing that these processes have led to a decreasing willingness among COEs and their universities to seek DHS funding.

During interviews, COE and DHS stakeholder participants discussed positive and negative perspectives on research outcomes, with both participant groups highlighting again the misalignment in expectations between DHS's product preferences and university research preferences. COE participants also discussed the strengths of their workforce development and educational initiatives, which was supported by some DHS stakeholders who found value in student engagement through research projects and internships.

Finally, we identified two key findings related to DHS COEs' transition from active to emeritus status. First, COE participants perceived the loss of DHS funding upon transition to emeritus status as negatively impacting the COE. Challenges in securing other funding sources (through BOAs or outside of DHS) make it difficult to maintain intellectual infrastructure and administrative support and reduce budget planning capabilities. Second, these challenges are compounded with the loss of OUP program manager support and weakened relationships with DHS components, leading to underutilization of emeritus COEs. Collectively, these findings provide insight into the positive experiences of both COE personnel and the DHS component stakeholders who work with COEs, and help to identify potential areas to facilitate stronger outcomes and strengthen research partnerships.



## Other Federal Programs Review

To better understand how research through university partnerships has been pursued across the federal government, we considered the approaches taken by other federal departments and agencies that fund and oversee COEs or COE-like programs.<sup>1</sup> This chapter presents the findings of our review and analysis.

### Overview of Selected Federal Programs

In this section, we present a brief overview of the other federal programs selected for inclusion in the study. Each overview highlights the program’s main research focus and the mechanism by which the program funds its centers.<sup>2</sup> The overviews also include information on the typical duration of an initial award, whether COEs have opportunities to renew (i.e., receive additional awards through a noncompetitive process) and/or recompute (i.e., receive additional awards through a competitive process), and how often COEs may pursue renewal and/or recompute opportunities.

CDC has two programs included in this analysis. CDC funds the **PRCs** through five-year cooperative agreements, which can be recompeted. These university-based programs conduct “research that promotes health and prevents chronic illness and other diseases and disabilities” (CDC, 2022). CDC funds the **BOLD Public Health Programs** through five-year cooperative agreements, which can be recompeted. The program consists of three Psychological Health Centers of Excellence (PHCoEs) and 43 distinct Public Health Programs to “build infrastructure and increase capacity in the field of Alzheimer’s disease and related dementias” (CDC, 2023b).

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<sup>1</sup> Although some programs use “center of excellence” to describe a research organization affiliated or sponsored by a federal department or agency, others employ different labels. For example, CDC have university research partnerships called “prevention research centers,” and the DOE has EFRCs. For simplicity, we refer to all of these organizations as COEs when referencing them generally; where we discuss specific programs, we use their respective titles.

<sup>2</sup> Additional details about each program are in Appendix B. These program overviews may be used as a reference to consider how different government departments and agencies approach establishing, managing, and funding university research partnerships through COEs. Based on the information gathered, some longer profiles also detail engagement between a COE and its funding department or agency.

Since 2009, DOE has funded over 100 EFRCs, which are led by either universities or national laboratories, to address “grand scientific challenges” in energy science research (DOE, undated-b). The EFRCs are initially funded through grants or cooperative agreements for four years, with opportunities to pursue two-year extensions or four-year renewals.

HHS has two programs included in this analysis. HRSA funds COEs through grants for a five-year period of performance, which can be recompleted. HRSA COEs “improve access to culturally appropriate health care by increasing the number of underrepresented minority students who enter and graduate from health professions training programs” (HRSA, undated). SAMHSA funds a **Center of Excellence on Social Media and Mental Wellbeing (SMMW-CoE)** through five-year cooperative agreements. The SMMW-CoE was established “to develop and disseminate information, guidance, and training on the impact of children and youth’s social media use (risks and benefits), especially the potential risks social media platforms pose to their mental health; and the clinical and societal interventions that could be used to address these risks” (SAMHSA, 2023).

FAA Air Transportation COEs typically have ten years of funding through a cooperative agreement “to help develop the nation’s technology base while educating the next generation of aviation professionals” (FAA, undated-a). The FAA requires their COEs to get a one-to-one matching contribution, which is intended to promote strong relationships between the Air Transportation COEs, their university homes, the FAA, and industry partners.

We reviewed four NIH programs for this study. NIH funds **Maternal Health Research COEs** through seven-year cooperative agreements, which can be recompleted. The centers were established as part of the Implementing a Maternal Health and Pregnancy Outcomes Vision for Everyone (IMPROVE) initiative to “develop and evaluate innovative approaches to reduce pregnancy-related complications and deaths and promote maternal health equity” (NIH, 2023b). NCI funds **TRACE** through five-year grants. TRACE centers were established to “rapidly develop an evidence base of telehealth approaches to cancer care, identify and address disparities in access to and use of telehealth services, foster innovations to improve cancer care delivery, and evaluate the impact of changing policy and payment environments” (NCI, 2023). NHGRI funds **Centers of Excellence in Ethical, Legal, and Social Implications (ELSI) Research (CEER)** through three-year Exploratory Center Grants (P20) and four-year Collaborative Program Grants (RM1), which can be competitively renewed once. CEERs seek to “bring investigators from multiple disciplines together to work in innovative ways to address important new, or particularly persistent, ethical, legal, and social issues related to advances in genomics” and “support the growth of the next generation of researchers on the ethical, legal and social implications of genomic research” (NHGRI, 2019). NIMHD funds **Specialized COEs on Minority Health and Health Disparities** through five-year cooperative agreements, which can be recompleted. The NIMHD centers were established to “conduct transdisciplinary, multi-level research and to provide research opportunities for postdoctoral fellows, junior faculty, and other early-stage investigators to engage in this type of research” (NIMHD, 2017).

NIST supports two COEs that were included in this analysis. The **NIST Advanced Materials COE**, known as the Center for Hierarchical Materials Design (CHiMaD), was created in

response to the Materials Genome Initiative (MGI) (National Science and Technology Council, 2011), while the **NIST Community Resilience COE** was established to design and develop the Interdependent Networked-Community Resilience Modeling Environment (Colorado State University, undated). Both centers received initial five-year awards through cooperative agreements and received one-time renewals of five years.

For this study, we reviewed three NOAA programs. **NOAA Research Labs** conduct research with the goal of improving understanding of the Earth System (NOAA, undated). They are distinct among the programs selected for analysis, as they are considered internal to NOAA, making them not awarded but funded through a combination of base funding and soft money (i.e., funding dependent on grants). **NOAA CIs** perform research in support of NOAA's Mission Goals and Strategic Plan (NOAA, undated), and are often colocated with NOAA Research Labs (National Centers for Environmental Information [NCEI], 2018), though they are funded by five-year cooperative agreements. The CIs may have one opportunity to renew for another five-year award, but after ten years they must recompete or sunset. The **NOAA Sea Grant** program awards four-year cooperative agreements that can be recertified without limit for four years at a time (National Sea Grant Office [NSGO], 2022). Universities supported by Sea Grant support the program's mission "to enhance the practical use and conservation of coastal, marine and Great Lakes resources in order to create a sustainable economy and environment" (Sea Grant, undated).

**NSF** has three programs included in this analysis. NSF funds the **National AI Institutes** for a minimum of five years, with the potential to be renewed for additional five-year awards if they remain in good standing. The National AI Institutes are expected to produce "long-term, high-reward AI research" (NSF, undated-b) under their cooperative agreements, which may include funding from external government and industry research partners. As of January 2024, **CI CoEs** program has awarded two universities with standard, five-year grants to "provide services, expertise and training on cyberinfrastructure technology to the research and cyberinfrastructure communities" (NSF, 2019b). CI CoEs can be renewed for additional five-year periods if they remain in good standing. The NSF also oversees a **Cybersecurity COE** called Trusted CI, which was established to "lead the development of an NSF Cybersecurity Ecosystem" (Trusted CI, undated). NSF initially funded Trusted CI through two three-year grants, before switching to a five-year cooperative agreement in 2019 (Adams et al., 2019), and will likely allow an opportunity for noncompetitive five-year renewal if the center remains in good standing.

**NIJ** supports **FTCOE** through a cooperative agreement that is recompeted every five years. Led by the nonprofit research institute Research Triangle Institute (RTI) International, FTCOE works with academia, industry, and crime laboratories to focus on the research, development, testing, and evaluation of emerging forensic technologies (FTCOE, undated).

**DoD** supports strategic research programs at universities called **UARCs**, which have "a set of core competencies—areas of domain expertise or specialization—that are tailored to the long-term needs of the Department" (USD(R&E), undated). UARCs for both the U.S. Army and the U.S. Navy are established through a competitive selection process

and can be redesignated every five years. Once selected, UARCs are funded by sole-source noncompetitive contract funding, which can vary year to year based on Congressional budget (Lemnios, 2010).<sup>3</sup>

## Insights from Other Federal Program Interviews

This section presents the findings from our targeted analysis of other federal program interview data related to the themes identified by our analytic approach. The data was collected from 24 total participants from 15 distinct federal programs during 21 interview sessions. Other federal program interviewees were government employees in 18 sessions and university employees in three sessions. These interviews were not for attribution, but where appropriate, we include information that links a participant to specific program characteristics such as center duration. The main topics of analysis include the outcomes of federal program COEs, the characteristics that make a COE successful, challenges for productive engagement, and the impacts of center duration. These findings are synthesized with those from the DHS COE analysis towards the end of this report, where we make recommendations and provide overall conclusions regarding the structures, functions, and processes of COEs as research partnerships between the federal government and universities.

**Successful COEs have resulted in positive outcomes for other federal departments and agencies that support them. COEs' service as vehicles for research and development was identified as a predominant and consistent broader impact.** Participants in 12 sessions reported that COEs are providing training, education, and outreach to a wider community, and in turn, they are building an intellectual infrastructure that brings together academic, stakeholder, decisionmaker, and for-profit entities. The value of this intellectual infrastructure for the federal program was lauded. COEs were described as creating an effective and better-connected space for these entities to network, collaborate, and share expertise.

**Other federal program participants shared two key characteristics for facilitating COE success: close collaboration between the federal program and COE and funding support from other sources.** Participants in nine sessions cited that close research collaboration and partnership between a COE and federal program is a key characteristic supporting COE success. Positive engagements resulted from

- a cooperative relationship between the COE and federal program,
- the federal program's promotion of partnerships with stakeholders (including with federal scientists), and
- effective communication and progress updates.

The presence of federal employees who are academically-minded individuals or technical experts within other federal programs, sometimes even directly embedded within the COE,

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<sup>3</sup> It should be noted UARCs are not exactly analogous to COEs; however, because they perform similar kinds of work, a discussion of UARCs is included for completeness.

was also regarded as valuable. For example, one federal program participant noted that of their two program managers for a center, one is a subject-matter expert who can provide support on scientific issues. A second key reason cited for COE success is the receipt of external funding outside of the primary federal agency or department, which may include “matching” funds, either from the university and/or other entities. Participants in 11 sessions reflected on how this funding impacts their COE. Respondents shared that external funding serves as a mechanism to broaden their COE’s scope of research in service of their base mission while also helping them to promote their mission and better integrate with universities. Through building research capacity, external funding also contributes to the long-term sustainability of COEs.

**Other federal programs overwhelmingly prefer cooperative agreements for COEs due to the flexibility and structure of these funding mechanisms, which support research collaboration with and routinized oversight by the funding organization.** Federal participants in seven sessions noted that cooperative agreements allow the agency or sponsor to directly collaborate in the research—supporting researcher-to-researcher communication without line items for a deliverable as required in contracts. Unlike grants, the agreements have the flexibility to use university infrastructure (e.g., personnel, services, and facilities) and to use federal services and facilities. Additionally, research grants from other sources to institutes or investigators can be administered through a cooperative agreement. Flexibility is built into the agreement because the aim is achieving research goals without being overly prescriptive.

**Some federal programs employ a combination of funding mechanisms or earmarked funds for key institutional needs, such as infrastructure or administrative support.** Contracts or other funding mechanisms are sometimes put in place to directly support the administrative components necessary in running a COE, allowing federal programs to specify how much was spent on particular budget items. Contracts are sometimes used to fund specialized infrastructure required for research in a federal program’s key topic area. Infrastructure needs often vary, ranging from expensive hardware (e.g., DNA sequencers and other molecular biology equipment) to funding specialized groups of experts providing research or outreach services (e.g., community engagement groups, consultation services, or social research methods support). Other federal programs had a “colors of money” approach meant to protect funding priorities (i.e., some money may only be used for basic science as opposed to more mature technology). Additionally, pools of merit money could be specified to incentivize competition and effort.

**The timing of funding presents challenges for other federal programs and COEs.** Participants in four sessions noted challenges with funding schedules, with misalignment between federal and academic calendars cited an example. This misalignment possibly results from the federal agency’s mission or efforts to smooth its workload when providing multiple grants, with one participant noting that awards are managed in calendar windows convenient for the federal program, as opposed to aligning with academic calendars and availability of research staff.

**While research collaboration, partnerships, and external funding facilitate federal program COE success, participants also shared characteristics perceived as hindering productive engagement.** One participant described challenges resulting from a misalignment between the federal department’s needs and their COE’s academic research capabilities. In four sessions, participants raised challenges associated with the proposal review process, including difficulties in finding appropriate academic reviewers, inefficiencies in the process, the administrative burden placed on the COE and federal program, and a lack of transparency from federal program individuals during the proposal process.

**Center duration varies by federal program, resulting in a range of potential impacts on the COEs.** We collected information through our document review on center duration for each of the 21 federal programs. Additionally, participants in 15 federal program interview sessions provided information regarding center duration. None of the other federal programs reviewed pursued transition of a COE to emeritus status similar to what DHS COEs experience.<sup>4</sup> Of the 21 federal programs, the NOAA Research Labs are an outlier in center duration, as they are structured as research collaborations internal to the agency as part of the Office of Oceanic and Atmospheric Research line office, and are not competitive awards (NOAA, undated). NOAA Research Labs are regularly evaluated on a five-year cycle, but those evaluations are not used for renewal or recomplete decisions.

Among the other federal programs, five allow their COEs to seek renewal of funding without recompetition if the COEs are determined to be in good standing through evaluation (Table 4.1).<sup>5</sup> NIST allows for its COEs in good standing to receive renewed support for an additional five years, after which the COEs are expected to transition to self-sufficiency or closure. NOAA Sea Grant recipients and the U.S. Army and U.S. Navy UARCs have no limit

**TABLE 4.1  
Federal Program COEs That Renew Without Recompetition**

Renewal Without Recompetition	Initial Period of Performance	Renewal Limit	Renewal Period of Performance
NIST Advanced Materials COE	5 years	1 renewal	5 years
NIST Community Resilience COE	5 years	1 renewal	5 years
NOAA Sea Grant	4 years	no limit <sup>a</sup>	4 years
U.S. Army University Affiliated Research Centers	5 years	no limit	5 years
U.S. Navy University Affiliated Research Centers	5 years	no limit	5 years

<sup>a</sup> NOAA Sea Grant labels their COE renewals as a “recertification.”

<sup>4</sup> Some COEs become self-sufficient by seeking external funding after their period of performance, but they are unlike emeritus centers since they are no longer managed nor funded by the original federal program.

<sup>5</sup> Technically the federal agency conducts a merit review (2 CFR 200.205).



to renewal opportunities, as long as they remain in good standing as determined through program evaluation.

Six of the selected federal programs allow their COEs opportunities to renew, but then eventually require the COEs to recompetete (Table 4.2). The DOE EFRCs, FAA Air Transportation COEs, and NOAA CIs may each be renewed for one additional period of performance before they must recompetete for funding. Based on our analysis, NSF's AI Research Institutes and CCoE are expected to recompetete eventually, though a limit for renewals has not been defined as of January 2023. NSF CI CoEs are able to be renewed, "subject to the outcome of performance reviews, NSF prioritization, continuing demonstrated need for the CI CoE, and availability of funds," (NSF, 2019b), but we were unable to gather specific information on renewal limits and periods of performance.

Nine federal programs require that their COEs recompetete after an initial period of performance (Table 4.3). For seven federal agencies, however, there are no limits to the number of times a COE may recompetete for funding.

Most of the other federal programs reviewed (17 of 21) provided five years of funding for the initial period of performance, with only three programs (NOAA Sea Grant, DOE EFRCs, and NHGRI CEERs) providing four-year awards and only one program (NIH Maternal Health Research Centers) providing seven-year awards. Federal program interview respondents believed that there are significant startup costs for establishing a center, leading many to choose five years as a minimum award necessary to develop research. This minimum duration was considered substantial enough for developing relationships and partnerships and for conducting quality research, although all programs offered opportunities for COEs to renew or recompetete, indicating that there is value in longer center durations.

Questions regarding COE duration elicited discussion of key benefits and challenges for longer and shorter duration COEs. **Federal participants from other programs with longer duration COEs (i.e., beyond ten years) cited several positive impacts, including increased administrative ease and agility, more established relationships, and increased stability**

**TABLE 4.2**  
**Federal Program COEs That Renew Then Recompetete**

Renewal Then Recompetition	Initial Period of Performance	Renewal Limit	Renewal Period of Performance
DOE EFRCs <sup>a</sup>	4 years	1 renewal	2 years
FAA Air Transportation COEs	5 years	1 renewal	5 years <sup>b</sup>
NOAA CIs	5 years	1 renewal	5 years
NSF National AI Research Institutes	5 years	no defined limit <sup>c</sup>	5 years
NSF CCoE	5 years	no defined limit <sup>c</sup>	5 years
NSF CI CoEs	5 years	unknown <sup>d</sup>	unknown <sup>d</sup>

<sup>a</sup>DOE EFRCs term their two-year renewal as an "extension" and their four-year recompetete as a "renewal" (DOE, 2021). <sup>b</sup>FAA renewals could be longer than five years, based on Congressional discretion. <sup>c</sup>NSF centers undergo recompetition after an undefined number of renewal cycles. <sup>d</sup>Unable to find information.

TABLE 4.3

**Federal Program COEs That Recompete Without Renewal**

Recompetition Without Renewal	Initial Period of Performance	Recompetition Limit	Recompetition Period of Performance
CDC BOLD Public Health Programs	5 years	no defined limit	5 years
CDC PRCs	5 years	no defined limit	5 years
HRSA COEs	5 years	no defined limit	5 years
SAMHSA SMMW-CoE	5 years	unknown	unknown
NCI TRACE	5 years	no defined limit	5 years
NHGRI CEER	4 years	1 recompetition	4 years
NIH Maternal Health Research COEs	7 years	no defined limit	7 years
NIMHD Specialized COEs on Minority Health and Health Disparities	5 years	no defined limit	5 years
NIJ FTCOE	5 years	no defined limit	5 years

**through the development of a network and research agenda. Federal participants from other programs with shorter duration centers (i.e., less than ten years) cited increased flexibility as a benefit, as turnover allows the introduction of new expertise and the ability to align a COE with evolving federal program mission needs.**

Longer duration COEs, via renewals or recompetes, often addressed long-term research, development, engineering, basic science, or broader research field needs. These COEs are frequently structured as large consortia with a range of experts across multiple universities. Additionally, these larger consortia can add or subtract universities as needed while maintaining a constant research nucleus. COEs with this structure leverage gains from using the same institutional and intellectual capital over time. Participants noted that if topic area or federal program needs regularly change, investments in institutional capital could be forfeited. Therefore, longer duration COEs often have a broad, basic science research area, allowing the funding organization to alter individual research questions over time without sacrificing core infrastructure or intellectual community.

Stable and consistent funding over a sufficiently long duration is also important for other federal programs in building a credible reputation and for being viewed as a key partner and source for research. It was noted that successful longer duration COEs often take on work from other government agencies and outside sources, creating additional value for the original federal program and helping support it over time.

One participant noted that shorter duration COEs within a renewal and recompetite process have an advantage in their ability to expand or reduce research activities without making a permanent or long-term financial commitment. Participants from COEs with a defined maximum of ten years at the outset were aware they would need to recompetite at some point.

This structure seemed to motivate COE leadership to seek funding outside of the primary department or agency, which in turn facilitated the center's sustainability.

Participants from other federal programs that allow longer durations also highlighted differences in renewal and recompetitiveness opportunities, with a notable tradeoff. **Continual renewals of a COE enable the formation of enduring partnerships that are crucial to research success; however, continually-renewed COEs may develop an expertise or infrastructure advantage, resulting in incumbent researchers or institutions being repeatedly selected if a competition is held.** As a result, a decision to allow repeated renewals without a recompetitiveness process minimizes other institutions' abilities to compete should the federal program decide to introduce a recompetitiveness process at some point in the future.

Finally, it was noted by several participants that elements of COE structure, processes, and functions across federal programs often originate from variation in underlying statute, funding authority, or congressional intents. These requirements often impacted the flexibility that the federal programs have in determining elements of COE strategy and design.

## Summary of Findings from Other Federal Programs Review

In this chapter, we documented several key findings from our qualitative analysis of the data collected in the document review and interviews, including insights into funding mechanisms, center duration, and outcomes of renewal and recompetitiveness processes.

Overall, when reviewing other federal programs we found that successful COEs operate as vehicles for research and development for the federal departments and agencies that support them. In addition, these COEs provide training, education, and outreach to a wider community and build intellectual infrastructure that brings together academia, industry, stakeholders, and decisionmakers. Our analysis found that successful COEs reported close collaboration between the COE and the federal program and benefit from external funding support. Close collaboration can be facilitated by bridging the disparity in the interests between academia (basic research) and the federal program (applied research), for example by having academically-minded people in the federal program, such as a program manager, who has subject-matter expertise and can understand and provide support on scientific issues.

With regard to funding mechanisms, cooperative agreements were preferred as funding mechanisms due to their flexibility and opportunities for collaboration between the federal program and the COE. The collaborative nature of cooperative agreements also routinizes the relationship between the federal program and the COE. Additionally, some federal programs employ a combination of funding vehicles, including contracts, or earmarked funds for key institutional needs such as infrastructure or administrative support. Having funding from sources other than the primary funding department or agency broadens the COE's scope and helps promote the COE's mission. We also identified characteristics that are perceived as hindering productive engagement, including the misalignment between academic research capabilities and federal program needs, project turnover

due to differences in technological merit perspectives, and challenges in the proposal review process.

We found that COE duration varies across federal programs, resulting in a range of potential impacts. For example, the selected federal programs pursued different approaches to initial awards (i.e., competitive and not competitive) and whether to allow award renewals and recompetes. Most interview participants agreed that given the significant costs of setting up a COE—in personnel, time, and other resources—an initial minimum of five years is needed for developing relationships and partnerships and for conducting quality research. All other federal programs offer opportunities for COEs to renew or recompete, indicating that there is value in longer center durations. Additional benefits of longer duration COEs include the following: increased administrative ease and agility; well-established relationships; increased stability through the development of a network and research agenda; and the building of a credible reputation as a key partner and source for research. Recompete processes were perceived as having benefits too. Participants noted that requiring COEs to recompete for support allows funding departments and agencies to adjust research activities outside of permanent commitments, fosters long-term COE sustainability due to the need to seek external funding, and may prevent established COEs from gaining a competitive advantage that minimizes other institutions' abilities to contribute.

Examination of differing approaches to center duration revealed that federal programs should consider the federal agency's or department's objectives when determining the intended duration of a COE. If the federal program seeks to establish COEs with a focus on basic research or the ability to take advantage of specific topics within a larger body of knowledge, then a longer duration COE might be the appropriate choice. However, longer duration COEs present both benefits (e.g., administrative ease, established relationships) and challenges (e.g., less flexibility) for the federal program. If the federal program needs flexibility to inject new ideas or has an evolving mission set, a shorter duration COE might be the appropriate choice. Shorter duration COEs provide that flexibility and responsiveness to evolving needs through recompetition processes, although they make the development of long-term, collaborative relationships more difficult.

This chapter documented the benefits and disadvantages of certain COE structures, functions, and processes and provided examples of different approaches to establishing, maintaining, and sunseting COEs. This analysis is intended to provide guidance to federal programs for establishing and maintaining COEs. The findings also help to identify potential areas to facilitate stronger outcomes and strengthen Public-Academic research partnerships.

## Recommendations and Conclusion

This research was conducted to assist OUP in assessing the structures and functions of DHS and other federal program COEs and determining the core functions needed to support current and future COEs. We have situated this analysis within the broader context of research partnerships, particularly those pursued by the federal government. Our review of COE and COE-like programs within federal government organizations was designed to examine a range of characteristics relevant to understanding the structures, functions, and processes of COEs as research partnerships between the federal government and universities. To do so, we reviewed documentation from DHS' program and its COEs and from COE programs and entities within other federal departments and agencies to determine the mission, objectives, structures, and management and oversight processes of federal COEs. We also held open-ended discussions with participants from OUP, DHS components, and DHS and other federal program COEs. Through our data analysis, we identified key insights.

This chapter presents recommendations for establishing and supporting appropriate structures, functions, and processes to support the research partnership established by federal departments and agencies with their programs and centers. These recommendations draw from the key insights and the experiences of the DHS COEs, OUP personnel, and input from other federal programs regarding the success of alternative structures, functions, and processes. The first five recommendations are provided in the spirit of providing any federal department or agency that supports or seeks to support COEs with potential actions areas for facilitating stronger outcomes and strengthening these research partnerships, which provide an important public good. Our sixth and final recommendation is tailored to the unique challenges associated with transitioning to emeritus status faced by DHS COEs.

### Recommendation 1: Federal Programs Should Identify and Mitigate Misalignment Between the Government and University-Based COEs

Some of the most successful research partnerships occur when federal programs recognize the challenges of operating academically-housed research centers to fully leverage the unique capabilities of their university partners. To this end, federal programs should identify and mitigate misalignment where possible. We found misalignment in several areas.

*Funding.* Numerous COEs, sponsored by DHS or other federal departments or agencies, reported challenges aligning government funding with academic and fiscal calendars. The federal programs should seek to align the timing of disbursements to critical junctures of academic funding need. This could alleviate challenges within COEs—faculty and students frequently need summer funding to support research opportunities. At minimum, notification and disbursement of funding in the spring semester would allow project leads to recruit graduate students and faculty researchers early in project development, mitigating hiring and retention issues. Alternatively, COE selection and communications could be modified to ensure university partners are either able to bridge funding gaps or well enough informed that they can make decisions with the certainty funding will arrive.

*Evaluation processes.* A federal program’s annual evaluation can often be duplicitous with university reporting requirements. Coordination between the federal program and the university could alleviate the COE’s administrative burden and simultaneously support federal reporting requirements. Failure to do so may both hamper COE research progress and disincentivize researchers from pursuing research through one federal program’s COE, pushing them to seek alternative funding through other federal programs or sources.

*Institutional Review Board (IRB) and privacy compliance.* Federal programs should work within their agencies to ensure the impacts of IRB, compliance, and privacy screenings are understood and addressed in project planning and execution to prevent research bottlenecks. Establishing a federal program staff role that could assist COEs through these processes may also provide benefits by institutionalizing related knowledge and experience.

## Recommendation 2: Federal Programs Should Recognize Agency and COE Diversity and Consider Tailored Evaluation Criteria

Some federal programs have the unique task of aligning a variety of internal organizations with diverse missions to universities with varied research foci. The resulting COEs may have some similarities, but will likely be focused on different technologies, methodologies, and outcomes than the aligned organizations. Interview participants from COEs and the federal agency’s internal organizations also expressed interest in the support of educational and workforce development initiatives, as well as engagement with MSIs. For example, as of 2024 one federal agency had development initiatives in place to support internships, MSIs, and workforce development. Yet, that program’s COE participants noted that their efforts in these areas were not accurately captured by evaluations, and they were not aware of proportional and clearly defined funding priorities to achieve them. Aims and resources should be matched, and evaluation formats and processes should recognize educational and workforce development initiative outcomes.

*Federal departments and agencies should consider tailoring their evaluations to account for these differences.* Where there are common characteristics across COEs, standardized criteria could, and perhaps should, be applied. This combination approach could result in evalua-

tions more relevant to each COE's research and deliverables. This could be accomplished in many ways, some requiring more administrative work than others. Simple solutions, such as using existing metrics but assigning different weights to goals, would require a small effort. Requiring workforce goals be aligned to research and technological transition goals for COEs with differing aims and capability sets would be a greater effort.

### Recommendation 3: Federal Programs Should Encourage and Facilitate More Robust and Transparent Engagement Between Internal Federal Organizations and COEs

*Levels of awareness, staffing, and usage plans to leverage the COEs varied greatly across and within the programs funded by federal departments and agencies.* One federal program has infrastructure in place to encourage productive engagement between internal organizations and COEs such as an annual meeting. However, communication efforts should be bolstered. Per a 2022 briefing, this federal agency is exploring the feasibility of a “one-stop shop” portal to facilitate communication and ease of access to COE products. Our analysis suggests this would likely be of value to multiple federal programs and COEs.

*Federal programs should strive to formally instantiate engagements as opposed to them being personality dependent.* Federal programs should encourage their organizations to dedicate staff or institutional structure to take advantage of COEs. The level of staffing should be commensurate with the internal organization's knowledge of a COE to facilitate the successful use of the COE's body of knowledge regardless of the COE's status or standing. In some cases, embedding federal staff within the COE, or COE staff within the federal agency, may be the most effective way to encourage knowledge transfer, facilitate engagement, or leverage expertise. Alternatively, federal departments and agencies could encourage designation of specific institutional roles for engaging with COEs. A directory of COE staff, capabilities, and activities located on the aforementioned one-stop portal could further aid in this process.

### Recommendation 4: Federal Programs Should Ensure Clear, Consistent Application of Standards and Policies Across Their COEs

Transparent standards should be applied consistently across COEs.<sup>1</sup> Providing these processes in a central location, accessible to the federal department or agency and COEs, would

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<sup>1</sup> This recommendation is not inconsistent with a tailored evaluation of COEs. There are common elements (e.g., programmatic oversight that includes financial, performance, and schedule adherence), which are necessary for any program. The tailoring could be accomplished via customized metrics, timing and types of interactions, formality of reporting, etc.

support transparency and manage expectations of all stakeholders. For example, managing discretionary program manager decisionmaking on contracting questions (e.g., whether research funding can support administrative staff) would reduce uncertainty for COEs and their supporting universities. This transparency would also support the COEs as they navigate any contracting processes. This guidance and institutional support could reduce barriers to internal organizations' engagement with COEs.

Federal departments and agencies should:

- *Centralize support policies* to reduce the burden on COEs and components (e.g., handling personally identifiable information or Controlled Unclassified Information reviews and contracting/regulatory administrative challenges).
- *Develop institutional roles* to alleviate administrative burdens on federal program managers and COE leadership. Formalizing roles and responsibilities helps ensure continuity and mitigate loss of institutional memory when there is department or agency staff turnover.
- *Codify and support transparency*, such that federal departments and agencies and their COEs can benefit from how-to-guides for contracts and critical processes (e.g., establishing BOAs). All agencies should prevent (or at least minimize) data siloing and promote cross-fertilization of ideas and efforts to support departments' and agencies' missions.

## Recommendation 5: Federal Programs Should Build Infrastructure and Processes to Preserve as Much Intellectual Capital from COEs as Possible

Federal programs invest sizeable amounts of time and resources in COEs. While departments and agencies should consider how to maintain and preserve the intellectual capital of all COEs, the potential to lose valuable physical, intellectual, and human capital is particularly high as a COE transitions from active status.

*Encourage a talent pipeline.* For example, some federal departments and agencies face significant recruiting challenges, both in terms of the quantity and the preparedness of potential workforce hires. COEs represent a pipeline of talent through which students can learn from and familiarize themselves with the department's or agency's mission spaces. This connection could be stronger through additional internships such as Homeland Security Professional Opportunities for Student Workforce to Experience Research within DHS or direct hiring pipelines, up-to-date content and capabilities directories, and additional opportunities for direct student and faculty engagement with the components, which may ultimately support integration of talent into the government workforce.

*Maintain knowledge repositories.* Federal departments and agencies and COEs can benefit from centralized knowledge repositories. These could include how-to-guides (e.g., how to navigate a BOA process), a centralized staff and capabilities directory across COEs, and code, tool, or data repositories for COE project outputs. Nascent projects, such as the pre-



vously mentioned exploratory one-stop portal for DHS, could serve as catalyst for such efforts.

*Support a community of scholars.* COEs develop and support a community of scholars who could be tapped to meet emerging federal needs. Through resources like knowledge repositories, departments and agencies could more easily identify COEs to engage as the needs arises. Inclusion in these resources might motivate less active or transitioning COEs to maintain and leverage their intellectual infrastructure in pursuit of other funding opportunities, such as BOAs or in response to notices of funding opportunity (NOFOs) issued by more active COEs. However, base funding would likely be necessary to sustain the administrative human capital to apply for these opportunities.

## Recommendation 6: DHS Should Address the Challenges Related to COE Transition to Emeritus Status

Finally, we identified challenges related to the transition to emeritus status specific to DHS COEs. Our analysis found DHS COE capability and continuity are hurt by the loss of DHS funding upon transition to emeritus status, especially due to the challenges of recruiting and maintaining administrative and research staff without base funding. These challenges are compounded by the loss of their OUP program managers' support, which contributes to underuse of the COEs' intellectual infrastructure and research capabilities and diminished connections with DHS components. DHS could mitigate these issues by:

- Creating and making a transition to emeritus status guide readily available to COEs to help them prepare well in advance for self-sustainability
- Providing materiel support in advance of a COE's transition, (e.g., small amount of base funding to support administrative infrastructure)<sup>2</sup>
- Developing knowledge repositories for COEs to document their capabilities and processes.

However, these actions do not address whether emeritus status is beneficial to the government or the COEs. This needs to be addressed, as COEs will continue to transition and the share of emeritus COEs relative to active COEs will continue to grow.

OUP should examine an approach to align center duration with other federal programs. DHS' approach to having COEs transition from active to emeritus status after ten years is distinctive among the reviewed federal programs. Although other programs may maintain connections to their COEs beyond ten years, they do so through renewal or recompute processes and provide base funding for multiyear periods of performance. For those programs that end research partnerships after ten years, the expectation is that the COE may pursue self-sufficiency (i.e., funded by sources other than the original funding department or agency) or closure. Closures are not perceived to be failures; rather they are seen as achieving the COEs'

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<sup>2</sup> The federal agency would need to work within federal procurement law to provide an materiel support.

objective—to perform and transition research in support of the federal program’s mission for the awarded ten years. Our analysis identified advantages and disadvantages to both the federal programs that only allow a finite period of performance for COEs and those that allow potentially infinite support. We found that for some elements of COEs decisionmaking, OUP and many other federal programs are constrained by statutory functions. But this is not always the case, and where possible, this study’s findings regarding structures, functions, and processes of center duration should be considered by DHS.

## Conclusion

In this chapter, we synthesized our findings from the analysis and made six recommendations for streamlining business processes. These included:

1. identify and mitigate misalignment between federal departments and agencies and university-based COEs;
2. recognize federal organization and COE diversity and consider tailored evaluation criteria;
3. encourage and facilitate more robust and transparent engagement between federal departments and agencies and their COEs;
4. ensure clear, consistent application of standards and policies across the COEs;
5. build infrastructure and processes to preserve as much intellectual capital from COEs as possible; and
6. address the challenges related to DHS COE transition to emeritus status.

We note that limitations apply to our analysis and recommendations. First, our analysis draws insights from contemporaneous parts of the DHS components-OUP-COE network. While this study did include active and emeritus COEs, it is important to caveat that our participant engagement processes may have produced some knowledge gaps. For instance, there was far less engagement with the COEs in some components and, as a result, some potential participants were not identified for outreach and inclusion. We were still able to gain valuable insights from stakeholders within the DHS components who are engaging with COEs, although they may not fully reflect the level of awareness and attitudes of other personnel in the components not actively engaging with COEs. Second, our recommendations reflect knowledge gained from discussions with multiple federal departments and agencies with a focus on DHS COEs, which are unique in their emeritus transition process.

Nevertheless, the contextualization of this work in a broader understanding of Public-Academic research partnerships and the general structures, functions, and processes of federal COEs make our findings of potential interest to the management and leadership of other federal COE programs and Public-Academic research partnerships, as well as to OUP management, S&T leadership, and DHS COE personnel. Additionally, the presentation of an exemplar decision tree suggests a way forward for federal programs to operationalize the study’s findings and incorporate them into decisionmaking processes.

# Supplementary Materials for DHS COE Review

This appendix provides additional methodological details and background findings for the DHS COE review as a supplement to the content provided in Chapter 3. More specifically, it presents the processes for identifying factors for analysis, selecting COEs for site visits, developing a discussion protocol, engaging interview participants, and analyzing interview data. This appendix also includes analysis of the engagement between DHS COEs and DHS components.

## Additional Methodological Details

This section provides a brief overview of each DHS COE to highlight its main research focus, status (i.e., active or emeritus), and—where available—the alignment between the COE’s research focus and specific DHS component missions. Using this background information, we developed our factor identification process, site visit selection process, development of the respective discussion protocols for DHS COE participants and DHS stakeholders, participant engagement strategy, and data analysis technique, which were summarized in Chapter 3 and are documented in more detail in this appendix. This section also presents information collected for each COE during the site visit selection process (Table A.2) and interview coding results (Tables A.3 and A.4).

## Overview of DHS COEs

**SENTRY Center** is an active center, established in 2021 to address threats to soft targets and crowded spaces via a suite of systems called Virtual Sentries (S&T, 2022m). SENTRY’s research aligns with the mission areas of six DHS components (S&T, 2022m).

**MBA-STT** is a masters-level, educational program focused on security and technology transition (S&T, 2022k). MBA-STT is an active COE launched in 2020 and is aligned with 11 DHS components (S&T, 2022k).

**NCITE** produces terrorism prevention and counterterrorism research to support the Homeland Security Enterprise (NCITE, undated). Established in 2020, NCITE is an active

COE that aligns with 12 DHS components (S&T, 2022l), engaging with them through both its cooperative agreement and BOAs.

**CBTS** does research in support of biodefense and response to biological threats and hazards (S&T, 2022i). CBTS was established in 2018 and is aligned with five DHS components (S&T, 2022i).

**CAOE** was established in 2017 and is an active COE aligned with seven DHS components and headquarters offices (S&T, 2022e). CAO E produces operational research on topics such as supply chain management, risk analytics, and economics (S&T, 2022e), with the aim to “improve efficiency and security at our national borders, ports and airports through better prediction and response to emergencies” (CAOE, undated).

**CINA** develops modern tools and technologies for criminal investigations, including criminal network analyses and traditional and digital forensics (S&T, 2022g). CINA is an active COE established in 2017 that is engaged with seven DHS components (S&T, 2022g).

**CIRI** does research that supports potential solutions to assessment, maintenance, and protection of the national critical infrastructure (CIRI, undated). CBTS was established in 2015, and is an active COE aligned with five DHS components (S&T, 2022h).

**CRC** was established in 2014, and is an active COE focused on ways to reduce the future impacts of coastal hazards, especially floods and hurricanes (S&T, 2022f). It is aligned with four DHS components.

**BTI** was established in 2015 and transitioned to emeritus status in 2021. The focus of BTI is to “enhance the Nation’s ability to secure its borders, facilitate legitimate trade and travel, and ensure the integrity of the immigration system” (BTI, undated).

**ADAC** is focused on the Arctic environment and maritime communications, crisis and disaster response (S&T, 2022d). Established in 2014 and transitioned to emeritus status in 2023, ADAC is aligned with two DHS components: the USCG and DHS S&T (S&T, 2022d).

**MSC** develops sensing technologies to detect, track, and classify threats on or in the water, and it is aligned with five DHS components (S&T, 2022j). MSC was established in 2014 and transitioned to emeritus status in 2023 (S&T, 2022j).

**CEEZAD** was established in 2010 and transitioned to emeritus status in 2016. CEEZAD’s research focuses on protecting “the nation’s agricultural and public health sectors against a high-consequence foreign animal, emerging and zoonotic disease threats” (CEEZAD, 2023), which aligns with ten DHS components and headquarters offices (S&T, undated).

**CCICADA** was established in 2009 and transitioned to emeritus status in 2016. CCI-CADA uses “advanced data analysis and systems to address natural and manmade threats to the safety and security of the American people” (CCICADA, undated).

**VACCINE Center** was launched in 2009 to create tools that transform data into useable information for DHS stakeholders (VACCINE, undated). It transitioned to emeritus status in 2017, but no longer uses BOAs to contract with DHS.

**ALERT Center** is a multiuniversity partnership that conducts research on effective characterization, detection, mitigation, and response to the explosives-related threats domesti-

cally and globally (ALERT, undated). ALERT was established in 2008 and transitioned to emeritus status in 2021.

**CHC** was co-led by the University of North Carolina at Chapel Hill and Jackson State University from 2008–2014 (CHC, undated). While officially an emeritus center, elements of CHC have been incorporated into the active CRC. CHC’s research focused on protection of people and property from coastal disasters.

**START** produces research on the “causes and consequences of terrorism, and the effectiveness and impacts of responses to terrorism” (START, undated). The center was started in 2004 and transitioned to emeritus in 2011 (START, undated), although START no longer uses BOAs to contract with DHS components.

**CREATE** was one of the first COEs established by DHS. CREATE was established in 2004, renewed in 2007, and transitioned to emeritus status in 2017 (CREATE, undated). The focus of CREATE is “to improve the Nation’s security through the development of advanced models and tools for the evaluation of the risks, costs, and consequences of terrorism and to guide economically viable investments in homeland security” (CREATE, undated).

**FPDI** was established in 2004 and transitioned to emeritus status in 2017. FPDI has many DHS clients, including S&T, CBP, CISA, the Chemical Security Analysis Center, Office of Health Affairs, and Office of the Chief Procurement Officer (FPDI, undated). FPDI aims to reduce the potential for contamination along the food supply chain.

**IIAD** focuses on different research solutions to address animal diseases through a One Health systems approach. The institute was established in 2004 and transitioned to emeritus status in 2015. While active, IIAD worked with the USCG, Countering Weapons of Mass Destruction, CBP, CISA, and S&T (IIAD, undated).

## Identification of Factors for Analysis of OUP’s Program and COEs

To determine this set of factors, we took the existing assessment categories that DHS was collecting (as provided in their shared documentation), then used the team’s subject-matter expertise and OUP feedback to develop additional qualitative dimensions to the existing categories.

As OUP already collects data in most of these categories for their own assessment, we used their assessment tools (e.g., biennial reviews, annual reports, COE workplans) to identify specific metrics (Table A.1). We also identified COE structure and function assessment areas for review (e.g., processes, oversight mechanisms, and management approaches). With these metrics and areas, we were able to further develop the additional qualitative dimensions, such as relevance and usage.

Once we had identified our factors for analysis, we reviewed several information sources, including program documentation provided by OUP (e.g., slide decks on COE and OUP structures and functions, standard operating procedures documents, COE assessment documentation). We also reviewed content posted by the COEs to their websites and other publicly available information. Using these sources, we documented the mission, objectives, frameworks,

**TABLE A.1**  
**Metrics for COE Assessment**

Metric Type	Metric	Qualitative Dimensions
Research Assessment Metrics	Software/Tools/Tech/Knowledge Products	Quantity, relevance, usage
	Patents Awarded	Quantity, relevance
	Response to DHS Requests	Fulfillment status, quantity completed, on-time percentage
	Congressional testimonies	N/A
	Peer reviewed publications	Relevance, impacts
	Response to Federal/State/Local Government requests	Quantity of requests fulfilled
	Supplemental COE funding	Quantity, mission relevance
Educational and Workforce Assessment Metrics	Number of graduates supported	Number of students enrolled, topic areas, undergraduate and graduate degrees awarded, forms of support provided
	Hands-on learning opportunities, internships	N/A
	Workshops	Number of participants, topic areas, DHS relevance
	Courses designed, degree programs, certificates	N/A
	Workforce development training	N/A

management and oversight processes, and historical and legal frameworks underpinning OUP's COE program.

## Process for Selecting COEs for Site Visits

Due to limited project resources, we could not visit each COE for in-person interviews. As a result, we identified a subset of COEs for site visits based on a set of factors designed to support a holistic evaluation with limited resources. Factors considered during the site selection process include:

1. *Current status.* COEs were categorized into active and emeritus. We stratified COEs along these lines to ensure that we would be able to obtain information on COEs over their lifecycle.
2. *Length of current status.* COEs were categorized into new (1–4 years), mid (5–7 years), and old (>7 years). We sought to ensure that site visits would provide a clear picture of COE phases.

3. *Focus area.* Using OUP’s categorization of thematic portfolios, COEs were designated one of five focus areas (critical infrastructure, borders and analytics, counterterrorism/law enforcement, maritime/resilience, and MSI/education programs) (OUP, 2022c).
4. *Amount of follow-on funding and funding mechanisms.* This funding includes external funds from universities or private organizations and BOAs or other agreements with DHS beyond the annual base grant from OUP. Data on follow-on funding was collected on most recent reporting cycle with complete data, and funds for this cycle were tracked between July 1, 2020, and June 30, 2021 (OUP, 2021). The amount follow-on funding was categorized into four levels of funding: none (\$0), low (between \$0 and \$1 million), mid (between \$1 million and \$2 million), and high (above \$2 million). This information was used to help tailor limited site visits to where the most activity would be taking place.
5. *Geographic location.* We sought to (a) leverage COEs which were close to RAND sites to minimize project resources required, (b) leverage COEs which were close to one another to minimize project resources required, and (c) capture COEs operating in both remote and urban areas.

During our document review, we also holistically considered COEs’ notable accomplishments (e.g., projects, publications, workshops and seminars), partnerships, educational programs, and historical performance and their documented partnerships with other COEs, DHS components, or private industry over the course of COE lifecycles (OUP, 2021). In addition, each COE produced a list of aligned DHS components, and the list was used to construct a Sankey diagram<sup>1</sup> to visualize the linkages in Figure A.1. This allowed us to ensure that we were capturing in person interviews with COEs that engaged broadly across components and COEs that worked intensively with only a few components. Using this information, and in consultation with OUP leadership, we identified eight COEs for in-person interviews. Personnel from the remaining twelve COEs were engaged through virtual interview sessions. Table A.2 documents the information collected for each COEs during the site selection process.

We sought to select COEs for site visits that represent a broad range of factors across the criteria considered. In total, eight COEs were selected for a site visit. Of those selected COEs, the range of factors represented were:

- Current status: two active and six emeritus.
- Length at current status: three new, one mid, and four old.

<sup>1</sup> A Sankey diagram “can be used to map value flows in systems at the operational level or along global value added chains” (Schmidt, 2008), and has adapted here to illustrate the linkages among DHS COEs and DHS Components.

**TABLE A.2**  
**Site Visit Selection Criteria for DHS COEs**

COE Name	Current Status	Length at Current Status	Main Focus Area	Follow-on Funding and Mechanisms	Geographic Location
SENTRY	Active	New	Critical Infrastructure	None	New England
MBA-STT	Active	New	MSI/Education Programs	None	DMV
NCITE	Active	New	Counterterrorism/Law Enforcement	Low	Midwest
CBTS	Active	Mid	Borders and Analytics	None	South
CAOE	Active	Mid	Borders and Analytics	Low	Southwest
CINA	Active	Mid	Counterterrorism/Law Enforcement	None	DMV
CIRI	Active	Old	Critical Infrastructure	Mid	Midwest
CRC	Active	Old	Maritime/Resilience	High	Southeast
BTI	Emeritus	New	Borders and Analytics	None	South
ADAC	Emeritus	New	Maritime/Resilience	Low	Alaska
MSC	Emeritus	New	Maritime/Resilience	Mid	New England
CEEZAD	Emeritus	Old	Counterterrorism/Law Enforcement	None	Midwest
CCICADA	Emeritus	Mid	Critical Infrastructure	None	New England
VACCINE	Emeritus	Mid	Critical Infrastructure	None	Midwest
ALERT	Emeritus	New	Critical Infrastructure	High	New England
CHC	Emeritus	Old	Maritime/Resilience	None	South
START	Emeritus	Old	Counterterrorism/Law Enforcement	None	DMV
CREATE	Emeritus	Old	Borders and Analytics	High	Southwest
FPDI	Emeritus	Old	Maritime/Resilience	None	Midwest
IIAD	Emeritus	Old	Counterterrorism/Law Enforcement	None	South

NOTE: Length at current status was determined in January 2023. New = 1–4 years at current status; Mid = 5–7 years at current status; Old = more than 7 years at current status. Follow-on funding listed as None = \$0; as Low = between \$0 and \$1 million; as Mid = between \$1 million and \$2 million; as High = above \$2 million. DMV = Washington, D.C., Maryland, and Virginia.

- Main focus area: two maritime and resilience, two borders and analytics, three counterterrorism and law enforcement, and one critical infrastructure.
- Follow-on funding: five reported no funding, one reported low levels of funding, and two which reported midlevels of funding.
- Geographic locations: one in Alaska, three in the South, two in the Midwest, one in New England, and one in the DMV.



Additional justifications for the selection of centers for site visits are included here for each center. **SENTRY** was not selected. Although the lead university at Northeastern is located close to the RAND Boston office, the center opted instead for a virtual conversation.

**MBA-STT** was not selected. MBA-STT is a degree granting program at a university rather than a research institute, so discussion about the center's education programs can be easily discussed over a virtual conversation, unlike discussions with other centers that have more research infrastructure (e.g., research laboratories, developed products).

**NCITE** was not selected. We wanted to select centers from a variety of focus areas, and NCITE was not selected in order to get better representation from centers in other focus areas.

**CBTS** was selected. CBTS is in the same university as IIAD at Texas A&M, and a site visit to both centers was an efficient use of limited project resources.

**CAOE** was not selected. We wanted to select centers from a variety of focus areas, and CAOEE was not selected to get better representation from centers in other focus areas.

**CINA** was not selected. We wanted to select centers from a variety of focus areas, and CINA was not selected in order to get better representation from centers in other focus areas.

**CIRI** was selected. CIRI and SENTRY are the only two active COEs that are focused on critical infrastructure. Since SENTRY opted for a virtual conversation, we wanted to conduct a site visit at CIRI.

**CRC** was not selected. CRC is colocated at two lead universities, Jackson State University and University of North Carolina Chapel Hill. A virtual conversation better allowed for input from members of both universities.

**BTI** was selected. BTI at the University of Houston is located close to the CBTS and IIAD, located at Texas A&M. A site visit to BTI was an efficient use of limited project resources.

**ADAC** was selected. ADAC recently transitioned from active to emeritus in 2023, and we wanted to hear the most recent accounts from the active to emeritus transition process. In addition, ADAC had organized a meeting attended by DHS and USCG stakeholders, and a site visit allowed for the opportunity to hear input directly from stakeholders.

**MSC** was selected. MSC recently transitioned from active to emeritus in 2023, and we wanted to hear the most recent accounts from the active to emeritus transition process.

**CEEZAD** was selected. CEEZAD has a long history of emeritus status and is still continuing to produce research outputs, under funding from other federal agencies, and a site visit would be conducive to see the level research infrastructure at an old emeritus center.

**CCICADA** was not selected. We wanted to select centers from both active and emeritus status, and CCICADA was not selected in order to get better representation from active centers.

**VACCINE** was not selected. We wanted to select centers from both active and emeritus status, and VACCINE was not selected in order to get better representation from active centers.

**ALERT** was not selected. ALERT has the same center leadership as SENTRY, and the virtual conversation with SENTRY allowed for discussion about ALERT.

**CHC** was not selected. CHC is an emeritus center that became CRC. The virtual conversation with CRC allowed for discussion about CHC.

**START** was selected. START has a long history of emeritus status but has not received follow-on funding, and a site visit would be conducive to seeing the level of research infrastructure that was maintained by the center.

**CREATE** was not selected. We wanted to select centers from a variety of focus areas, and CREATE was not selected in order to get better representation from centers in other focus areas.

**FPDI** was not selected. FPDI extensively supports professional development, education, and training programs, which can be more easily discussed over a virtual conversation.

**IIAD** was selected. IIAD is located in the same university as CBTS at Texas A&M, and a site visit to both centers was an efficient use of limited project resources.

## Discussion Protocol

To develop separate discussion protocols for DHS COE and DHS stakeholder participants, we reviewed the key factors for analysis of the OUP program and its COEs. The factors identified through discussions with OUP leadership and the document review informed the questions used to elicit information relevant to the study from DHS COE and DHS stakeholder participants. Specifically, we developed questions on evaluation processes, funding structures and processes, COE structure and function, and COE impacts. In preparation for each interview, we reviewed the information gathered through the document review to identify gaps in our knowledge. Our semistructured interview approach allowed us to adapt the protocol to be specific to the COE participants' associated center or to the DHS stakeholders' experiences with certain COEs.

At the start of each interview, the HSOAC interview lead, notetaker, and any other research team members who were present introduced themselves to the participant(s). The interview lead reviewed the consent protocol and requested verbal confirmation of consent from the participant(s) before proceeding with the interview. The interview lead used the discussion protocol to guide the discussion, though participants were also encouraged to raise relevant topics as they saw fit.

### DHS COE Participant Discussion Protocol

#### Introductions

We'd like to begin the session with introductions.

- What is your title? What is your position/role at [COE name]?
- How long have you been involved in [COE]?

Thank you for providing that background information. We'd like to now focus on a few key topics related to the evaluation, funding, structure, and impacts of [COE program name]. We've prepared a series of questions to guide the discussion, but we encourage you to raise relevant issues or topics as you see fit during the session.

### Evaluation

- What are the strengths of OUP's evaluation process of the COEs? What are the weaknesses?
- Is there additional information that should be collected or shared with OUP as a result of Annual Reviews, Site Visits, or Biennial Reviews?
- Do reporting requirements for Annual Reviews, Site Visits, or Biennial Reviews impact COE functions in a meaningful way?
- Are there sufficient mechanisms in place to encourage productive interaction between OUP management, the Board of Directors, and COE principal investigators and Managers?

### Funding

- Have you encountered any issues with the current contracting process which you believe could impact your center's ability to provide support to DHS?
- Is the structure with an initial first wave of projects, followed by additional small project tasks, conducive to ongoing research productivity? Have unexpected issues arisen?
  - Does the consistency of funding impact the quantity or quality of research? And if yes, how?
  - If [name of COE] receives funding from sources other than OUP, please describe the importance of nondepartment/agency-based funding for the quality and quantity of research.
  - If OUP is the current primary source of funding for the affiliated centers, are there any plans or expectations for the centers to transition to other funding sources over their respective durations?

### DHS COE Structure

During our background research, we found that COEs for federal organizations vary in their structure. For instance, some non-DHS COEs employ different funding mechanisms, while other organizations and their COEs take different risk postures when handling privacy or IRB concerns.

- Are adequate mechanisms in place to support IRB and privacy compliance efforts. If not, have compliance or privacy issues interfered with your ability to complete work plans or small project tasks?
- Is a ten-year window long enough for the planned research investments to reach completion and is your COE actively developing a plan for recompetition or transition into emeritus form?

One important component with which each COE is tasked is establishing initiatives to advance the future workforce (e.g., providing coursework, conducting trainings through professional development opportunities, organizing workshops).

- Have these integrated well into the center's host university/universities (i.e., are there sufficient enrollment and interest)?

### Impacts

- When a research project is completed, are there sufficient mechanisms in place to collaborate effectively with stakeholders (including DHS components) to successfully transition the project? Risks that transition plans may face include the integration and interoperability of systems, technical or deployment issues when the product is transitioned, etc.
- If applicable, could you describe the process through which collaboration has arisen with other COEs and DHS components? Are the annual conferences sufficient for supporting collaboration across COEs and DHS components?
- For the COEs that are housed across more than one university (i.e., one lead university and several close university partners), can you describe the nature of your collaboration with these other universities? Are there any barriers to operating effectively across different campuses?
- Does [name of COE] establish and track any metrics different than what are set by OUP to measure its impacts (i.e., number and/or value of academic contributions or partnerships, developed technologies or products, workforce development, etc.)?
- Do you use any additional metrics by which to measure the broader impacts of [name of COE] on DHS?
  - If so, could you share those metrics with us, including any variation across them over time?

Before we wrap up the session, we'd like to ask, are there any topics or questions that we did not touch upon in our discussion today but that you think are worthy of our attention?

## DHS Stakeholder Participant Discussion Protocol

### Introductions

We'd like to begin the session with introductions.

- What is your title? What is your position/role at [Component name]?
- Can you briefly describe your experience with the COEs? [interviewer should know with which COE(s) the participant has worked]

Thank you for providing that background information. We'd like to now focus on a few key topics related to the structure, processes, and impacts of the DHS COEs. We've prepared a series of questions to guide the discussion, but we encourage you to raise relevant issues or topics as you see fit during the session.

### COE Processes

- How has your Component/office been made aware of the COEs and their work?
  - Does your Component receive information from or otherwise engage with OUP about the COEs?
- Please describe the engagement process(es) through which your Component works with the COEs (e.g., monthly meetings, workplan reviews, annual meetings/conferences, etc.).
  - Do you think those processes are sufficient for productive engagement?
- What has your relationship been like with OUP's Program Managers?
  - How do they play a role in your Component's engagement with the COEs?
- Who (i.e., roles/positions) within the Components engages with the COEs?

### Evaluation Processes

- To your knowledge, does your Component maintain an evaluation process of its relationship with the COEs?
  - If yes, has that evaluation process identified any strengths and/or weaknesses to engaging the COEs?
  - Is there additional information that should be collected or shared with OUP as a result of any evaluation by the Component?
- Are there reporting requirements for the Component in COE Annual Reviews, Site Visits, or Biennial Reviews?
  - If yes, do these requirements impact the relationship between the COEs and the Component?

### Impacts

- When a research project is completed, are there sufficient mechanisms in place to successfully transition the project?
- For the COEs that are housed across more than one university (i.e., one lead university and several close university partners), can you describe the nature of your collaboration with these other universities? Are there any barriers to collaborating effectively with more than one university partner/COE?
- Does [participant's Component] track any metrics to measure the impacts of partnerships with the COEs specifically (i.e., transitioned technologies, workforce contributions, etc.)?
  - If so, could you share those metrics with us, including any variation across them over time?

### DHS COE Structure

During our background research, we found that COEs for federal organizations vary in their structure. For instance, some non-DHS COEs employ different funding mechanisms, while other organizations and their COEs take different risk postures when handling privacy or IRB concerns. Based on this research, we'd like to ask some questions about your experience with the COEs related to funding and other topics.

### Funding Structure(s)

- Have you worked with active COEs through their cooperative agreement?
- Have you worked with active COEs through BOAs?
- Have you worked with emeritus COEs through BOAs?
- If yes to more than one, can you describe any similarities or differences with working through those funding vehicles?
- Is the structure with projects established under a cooperative agreement, followed by additional project tasks funded by BOAs, conducive to ongoing research support to DHS?
  - Does the consistency of funding impact the quantity or quality of research? And if yes, how?
- Have you encountered any issues with the contracting process that could impact the COEs' ability to support DHS?

### Other Topics

- Are adequate mechanisms in place to support IRB and privacy compliance efforts. If not, have compliance or privacy issues interfered with your Component's ability to work with COEs?

COEs are tasked by OUP to establish initiatives to advance the future workforce (e.g., providing coursework, conducting trainings through professional development opportunities, organizing workshops).

- Have you had any experience with the COE's workforce development or educational initiatives? Can you talk about the Component's role in those initiatives?

Before we wrap up the session, we'd like to ask, are there any topics or questions that we did not touch upon in our discussion today but that you think are worthy of our attention?

### Participant Engagement

In addition to our review of OUP and COE documents, we identified personnel within each DHS COE for engagement. We initially reached out to 38 potential participants, based on their current or former leadership roles within the COEs (e.g., director, deputy/assistant director, education director, workforce development director, program managers, lead researchers, etc.). Using a snowball sampling method, we asked potential participants to recommend others who fit the study criteria and might be willing to meet with the research team. Through this method, we identified an additional 23 potential participants. Our total outreach to 61 potential participants yielded 52 engaged participants (85% response rate) from all 20 COEs whom we engaged in 28 interview sessions. Thirty COE participants were interviewed during in-person sessions, and 22 COE participants were interviewed during virtual sessions.

We pursued a similar method for engaging DHS stakeholders who had worked or are working with COEs. As there are no designated roles or positions within DHS components who are responsible for contact with the COEs, we sought input from COE participants and OUP, soliciting recommendations for DHS stakeholders who fit the study criteria and might be willing to meet with the research team. We also considered which DHS components had the strongest alignment and engagement with COEs and aimed to include stakeholders from those components in our outreach. We contacted 13 potential participants from seven DHS components (CBP, CISA, ICE, the Office of Strategy, Policy, and Plans, S&T, USCG, and USSS), and spoke with 12 participants total (92% response rate) in 11 virtual sessions.

Lastly, we held semistructured discussion sessions with eight members of OUP's staff to gather additional background information to fill the gaps in our knowledge of OUP and its COE program. These participants were identified by OUP leadership as personnel who might be willing to meet with the research team. We spoke with OUP's Director, Deputy Director, five COE Program Managers, and the Program Manager for Minority Serving Institutions and Workforce Development. Data gathered from these discussion sessions were not included in our analysis, however, as they were for background only.

## Interview Data Analysis

Using the information collected in Task 1, we completed a targeted qualitative data analysis to identify lessons learned, best practices, and recommendations for OUP's way forward. To identify, examine, and interpret patterns and themes in textual data and to determine how these patterns and themes help answer the research questions, we used an emergent coding technique (Elliott, 2018). We first independently identified themes during a preliminary examination of the notes from interviews with DHS COE and DHS Stakeholder participants. Then, we compared and discussed those themes to reconcile any differences and develop a set of larger themes and definitions in a codebook (Tables A.3 and A.4). These topics formed the basis of the analysis for the interview set.

Using the COE and DHS Stakeholder codebooks, a group of three to four researchers independently evaluated and identified the presence of topics within a sample of each of the interview sets. They then compared their results to determine their interrater reliability (IRR). The percent of agreement was calculated across all pairs of researchers within each interview set, and an acceptable threshold was 70% with a preferred threshold of 80%. Groups who achieved an IRR lower than these thresholds revisited the codebook, converged on understanding of topics, and repeated the sample coding until their IRR was acceptable. An average IRR value of 89% was achieved for the DHS COE codebook, and 94% for the DHS Stakeholder codebook. Both the frequency count of each topic and the content within were captured during the analysis and shared in this report. Content included information about aspects of the topic that were important to respondents, as well as whether they shared a positive and/or negative perspective about the topic.

TABLE A.3

## Codebook and Results for Analysis of DHS COE Interview Data

Level 1 Code	Level 2 Code	Level 3 Code
<b>Status (N=28)</b> Current status of COE (two COE interview session included participants from both active and emeritus status)	<b>Active (N=13)</b> COE is currently active	N/A
	<b>Emeritus (N=17)</b> COE is currently emeritus	N/A
<b>Evaluation (N=25)</b> Process for internal or external review and feedback	<b>Annual (N=14)</b> Annual reviews, reports, meetings, and other evaluation activities	<b>Positive (N=8)</b> Advantages to annual evaluations; positive feedback
		<b>Negative (N=7)</b> Disadvantages to annual evaluations; negative feedback
	<b>Biennial (N=12)</b> Evaluation activity occurring every two years	<b>Positive (N=6)</b> Advantages to biennial evaluations; positive feedback
		<b>Negative (N=8)</b> Disadvantages to biennial evaluations; negative feedback
	<b>Project (N=12)</b> Evaluation of specific projects	<b>Positive (N=2)</b> Advantages to project evaluations; positive feedback
		<b>Negative (N=9)</b> Disadvantages to project evaluations; negative feedback
	<b>Ad Hoc (N=10)</b> Quick fire, nonroutine	<b>Positive (N=3)</b> Advantages to ad hoc evaluation; positive feedback
		<b>Negative (N=6)</b> Disadvantages to ad hoc evaluation; negative feedback
<b>General (N=15)</b>	<b>Positive (N=1)</b> General evaluation perspective; positive feedback	
	<b>Negative (N=11)</b> General evaluation perspective; negative feedback	
<b>IRB/Privacy/Compliance (N=14)</b> Evaluation activities or requirements of research	<b>Positive (N=3)</b> Advantages to the processes; positive feedback	
	<b>Negative (N=10)</b> Disadvantages to the processes; negative feedback	
<b>Funding (N=24)</b> Financial landscape of the COE	<b>Cooperative agreements (N=19)</b> Type of funding	<b>Positive (N=7)</b> Reflects positively on cooperative agreement funding mechanism
		<b>Negative (N=17)</b> Reflects negatively on cooperative agreement funding mechanism
	<b>BOAs as active (N=10)</b> Type of funding for active COE	<b>Positive (N=3)</b> Reflects positively on BOA funding mechanism
		<b>Negative (N=6)</b> Reflects negatively on BOA funding mechanism



**Table A.3—Continued**

Level 1 Code	Level 2 Code	Level 3 Code	
Funding (N=24) Financial landscape of the COE (continued)	<b>BOAs as emeritus (N=13)</b> Type of funding for emeritus COEs	<b>Positive (N=4)</b> Reflects positively on BOA funding mechanism  <b>Negative (N=6)</b> Reflects negatively on BOA funding mechanism	
	<b>University support (N=11)</b> Cost-sharing	<b>Positive (N=9)</b> Reflects positively on university funding support  <b>Negative (N=2)</b> Reflects negatively on university funding support	
	<b>Other government (N=15)</b> Other departments or funding agencies	<b>Positive (N=7)</b> Reflects positively on other government funding support  <b>Negative (N=2)</b> Reflects negatively on other government funding support	
	<b>Industry (N=5)</b> Private financial support	<b>Positive (N=2)</b> Reflects positively on industry funding  <b>Negative (N=1)</b> Reflects negatively on industry funding	
	<b>COE NOFOs (N=7)</b> Responding to active COE request for proposals (RFPs)	<b>Positive (N=2)</b> Reflects positively on COE NOFOs  <b>Negative (N=4)</b> Reflects negatively on COE NOFOs	
	Engagement (N=26) Relationships, communication, and collaborations	<b>COE-DHS (N=26)</b>	<b>Positive (N=14)</b> Effective engagement to further the mission of the COE  <b>Negative (N=20)</b> Engagement is not effective for furthering the mission of the COE
		<b>COE-COE (N=13)</b>	<b>Positive (N=5)</b> Effective engagement to further the mission of the COE  <b>Negative (N=7)</b> Engagement is not effective for furthering the mission of the COE
		<b>COE-MSI/other units (N=9)</b>	<b>Positive (N=5)</b> Effective engagement to further the mission of the COE  <b>Negative (N=5)</b> Engagement is not effective for furthering the mission of the COE
		<b>COE-industry (N=6)</b>	<b>Positive (N=5)</b> Effective engagement to further the mission of the COE  <b>Negative (N=1)</b> Engagement is not effective for furthering the mission of the COE

**Table A.3—Continued**

Level 1 Code	Level 2 Code	Level 3 Code
Engagement (N=26) Relationships, communication, and collaborations (continued)	COE-government (N=3)	<p><b>Positive (N=0)</b> Effective engagement to further the mission of the COE</p> <p><b>Negative (N=2)</b> Engagement is not effective for furthering the mission of the COE</p>
	PM OUP—DHS Components (N=10)	<p><b>Positive (N=3)</b> Effective engagement to further the mission of the COE</p> <p><b>Negative (N=8)</b> Engagement is not effective for furthering the mission of the COE</p>
	COE-DHS components (N=19)	<p><b>Positive (N=12)</b> Effective engagement to further the mission of the COE</p> <p><b>Negative (N=11)</b> Engagement is not effective for furthering the mission of the COE</p>
Outcomes (N=21) Technical and nontechnical	Technology transition (N=21) Transition to DHS or further afield (e.g., industry) and related experiences	<p><b>Positive (N=13)</b> COE outcomes are positively achieving objectives and supporting DHS missions</p> <p><b>Negative (N=12)</b> COE outcomes are not positively achieving objectives and supporting DHS mission</p>
	Workforce developments (N=11) Activities, participation, success	<p><b>Positive (N=3)</b> COE outcomes are positively achieving objectives and supporting DHS missions</p> <p><b>Negative (N=4)</b> COE outcomes are not positively achieving objectives and supporting DHS mission</p>
	Educational initiatives (N=19) Activities, participation, success	<p><b>Positive (N=12)</b> COE outcomes are positively achieving objectives and supporting DHS missions</p> <p><b>Negative (N=8)</b> COE outcomes are not positively achieving objectives and supporting DHS mission</p>
	Data (N=9) Accessibility, sharing, documenting	<p><b>Positive (N=0)</b> COE outcomes are positively achieving objectives and supporting DHS missions</p> <p><b>Negative (N=7)</b> COE outcomes are not positively achieving objectives and supporting DHS mission</p>
Sunsetting (N=20) Final years of active COE as it approaches emeritus status	Funding (N=17) Plans to maintain financial support	<p><b>Positive (N=2)</b> Ensuring the success of transition to emeritus</p> <p><b>Negative (N=12)</b> Not supportive of transition to emeritus</p>

**Table A.3—Continued**

Level 1 Code	Level 2 Code	Level 3 Code
<b>Sunsetting (N=20)</b> Final years of active COE as it approaches emeritus status (continued)	<b>Role of PM (N=7)</b> Relationship and responsibility to the COE	<b>Positive (N=2)</b> Ensuring the success of transition to emeritus  <b>Negative (N=5)</b> Not supportive of transition to emeritus
	<b>Component relationships (N=6)</b> Interactions, connectedness, collaborations	<b>Positive (N=1)</b> Ensuring the success of transition to emeritus  <b>Negative (N=5)</b> Not supportive of transition to emeritus
	<b>Maintaining staff/admin (N=12)</b> Human resource needs of COE	<b>Positive (N=3)</b> Ensuring the success of transition to emeritus  <b>Negative (N=8)</b> Not supportive of transition to emeritus
	<b>COE transition prep (N=10)</b> Activities in anticipation for emeritus status	<b>Positive (N=2)</b> Ensuring the success of transition to emeritus  <b>Negative (N=7)</b> Not supportive of transition to emeritus

NOTE: For the Level 1 and 2 codes, “N” documents the number of interview sessions in which participants discussed the identified topic. For the Level 3 codes, “N” documents the number of interview sessions in which participants discussed the Level 1 and Level 2 codes and expressed a corresponding positive and/or negative sentiment.

**TABLE A.4**  
**Codebook and Results for Analysis of DHS Stakeholder Interview Data**

Level 1 Code	Level 2 Code	Level 3 Code
<b>Experience (N=11)</b> Stakeholder experience with active and/or emeritus COEs	<b>Active (N=11)</b> Stakeholder has worked with active COEs	N/A
	<b>Emeritus (N=4)</b> Stakeholder has worked with emeritus COEs	N/A
<b>Evaluation (N=11)</b> Processes for review and feedback by OUP and DHS Components	<b>OUP Reporting (N=1)</b> Stakeholder is involved in the reporting/ reviewing processes of COEs by OUP (e.g., annual reviews, biennial reviews, etc.)— <i>not including project workplan review</i>	<b>Positive (N=0)</b> Stakeholder reflects positively on the evaluation process; positive feedback  <b>Negative (N=0)</b> Stakeholder reflects negatively on the evaluation process; negative feedback
	<b>Project (N=8)</b> Stakeholder participates in evaluation of COE by DHS Component	<b>Positive (N=3)</b> Stakeholder reflects positively on the evaluation process; positive feedback  <b>Negative (N=3)</b> Stakeholder reflects negatively on the evaluation process; negative feedback

Table A.4—Continued

Level 1 Code	Level 2 Code	Level 3 Code
	<b>Component-specific (N=3)</b> Evaluation of specific projects	<b>Positive (N=1)</b> Stakeholder reflects positively on the evaluation process; positive feedback  <b>Negative (N=1)</b> Stakeholder reflects negatively on the evaluation process; negative feedback
	<b>Ad Hoc (N=1)</b> Quick fire, nonroutine	<b>Positive (N=1)</b> Stakeholder reflects positively on the evaluation process; positive feedback  <b>Negative (N=0)</b> Stakeholder reflects negatively on the evaluation process; negative feedback
	<b>General (N=5)</b> Noted evaluation processes without specific mention of other categories	<b>Positive (N=0)</b> Stakeholder reflects positively on the evaluation process; positive feedback  <b>Negative (N=1)</b> Stakeholder reflects negatively on the evaluation process; negative feedback
	<b>IRB/Privacy/Compliance (N=6)</b> Evaluation activities or requirements of research related to IRB/Privacy/Compliance	<b>Positive (N=3)</b> Stakeholder reflects positively on the evaluation process; positive feedback  <b>Negative (N=2)</b> Stakeholder reflects negatively on the evaluation process; negative feedback
<b>Funding (N=11)</b> Financial landscape of the COE	<b>Cooperative agreements (N=4)</b> Type of funding	<b>Positive (N=1)</b> Stakeholder reflects positively on engagement with COE related to this funding mechanism  <b>Negative (N=0)</b> Stakeholder reflects negatively on engagement with COE related to this funding mechanism
	<b>BOAs as active (N=5)</b> Type of funding for active COE	<b>Positive (N=2)</b> Stakeholder reflects positively on engagement with COE related to this funding mechanism  <b>Negative (N=2)</b> Stakeholder reflects negatively on engagement with COE related to this funding mechanism
	<b>BOAs as emeritus (N=3)</b> Type of funding for emeritus COEs	<b>Positive (N=1)</b> Stakeholder reflects positively on engagement with COE related to this funding mechanism  <b>Negative (N=2)</b> Stakeholder reflects negatively on engagement with COE related to this funding mechanism
	<b>General (N=5)</b> Noted funding without specific mention of other categories	<b>Positive (N=0)</b> Stakeholder reflects positively on engagement with COE related to this funding mechanism  <b>Negative (N=1)</b> Stakeholder reflects negatively on engagement with COE related to this funding mechanism

Table A.4—Continued

Level 1 Code	Level 2 Code	Level 3 Code
<b>Engagement (N=11)</b> Awareness, relationships, communication, and collaborations	<b>Awareness (N=10)</b> Discussed how participant and/or participant's Component gained awareness of DHS COEs	<b>How did stakeholder become aware of COEs?</b> <ul style="list-style-type: none"> <li>• through an OUP program manager (PM) (N=3)</li> <li>• through connections with COE leadership (N=5)</li> <li>• through another DHS stakeholder (N=4)</li> <li>• through other source (N=1)</li> </ul>
	<b>Engagement Processes (N=10)</b> Noted types of engagement with COE (e.g., meetings, reviews, etc.)	<b>Positive (N=2)</b> Stakeholder reflects positively on these engagement processes or relationship  <b>Negative (N=5)</b> Stakeholder reflects negatively on these engagement processes or relationship
	<b>Stakeholder-COE Relationship (N=9)</b> Nature of relationship between DHS stakeholder and COE	<b>Positive (N=8)</b> Stakeholder reflects positively on these engagement processes or relationship  <b>Negative (N=4)</b> Stakeholder reflects negatively on these engagement processes or relationship
	<b>Stakeholder-OUP PM Relationship (N=9)</b> <b>Nature of relationship</b> between DHS stakeholder and OUP PM	<b>Positive (N=2)</b> Stakeholder reflects positively on these engagement processes or relationship  <b>Negative (N=1)</b> Stakeholder reflects negatively on these engagement processes or relationship
<b>Outcomes (N=10)</b> Technical and nontechnical	<b>Tech/research transition (N=10)</b> Transition to DHS or further afield (e.g., industry) and related experiences	<b>Positive (N=8)</b> Stakeholder reflects positively on outcomes  <b>Negative (N=5)</b> Stakeholder reflects negatively on outcomes
	<b>Workforce developments (N=7)</b> Activities, participation, success	<b>Positive (N=4)</b> COE outcomes are positively achieving objectives and supporting DHS missions  <b>Negative (N=2)</b> COE outcomes are not positively achieving objectives and supporting DHS mission
	<b>Educational initiatives (N=6)</b> Activities, participation, success	<b>Positive (N=3)</b> COE outcomes are positively achieving objectives and supporting DHS missions  <b>Negative (N=1)</b> COE outcomes are not positively achieving objectives and supporting DHS mission

NOTE: For the Level 1 and 2 codes, "N" documents the number of interview sessions in which participants discussed the identified topic. For the Level 3 codes, "N" documents the number of interview sessions in which participants discussed the Level 1 and Level 2 codes and expressed a corresponding positive and/or negative sentiment.

## Additional Background

DHS' COEs are heterogenous in their capabilities and missions. This prevents excessive duplication of effort, broadens the full set of COE capabilities and expertise, and ensures novel mission spaces. At the same time, DHS components have distinct missions and needs for COE support. This heterogeneity translates into a significant amount of variation across the COEs in terms of which DHS components they each engage with and how many DHS components they engage with. Specifically, some COEs tend to engage with only a fraction of components, and some components rely on only a handful of COEs. For example, as of 2022, the USCG and CBP are supported by 15 COEs (seven active and eight emeritus, eight active and seven emeritus, respectively). At the same time, the Office of Intelligence and Analysis and USSS are supported by five COEs (three active and two emeritus and four active and one emeritus, respectively).

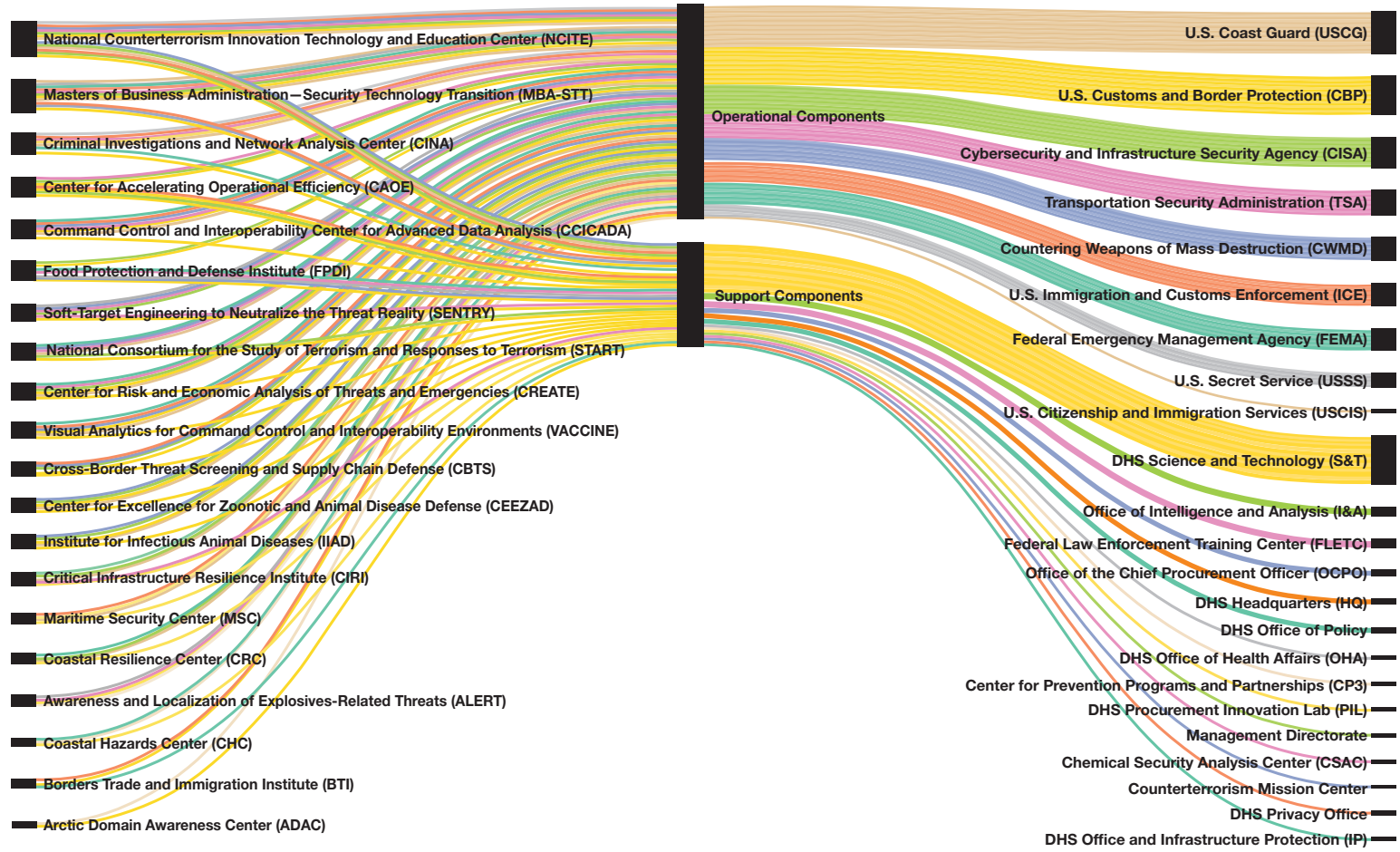
Productive engagement is a key component of the COE value proposition, so metrics which capture the structures that OUP has fostered can be informative. Metrics could possibly identify components in need of stronger support and COE diversity. Some COEs are diversified in their user base—working across many components and thus at less risk from idiosyncratic shocks to their research demands. Others might be more concentrated support and could be vulnerable to underutilization if a key component were to decrease its demands on the COE.

For each active COE, OUP tracks mission alignment with DHS components (OUP, 2022a; OUP, 2022b). It also maintains a list of which active and emeritus COEs currently provide support to each DHS component (OUP, 2022a; OUP, 2022b). Figure A.1 depicts this network of relationships through a Sankey diagram. The project team used the Sankey diagram to ensure that we distinguished between COEs that provide broad base component support and COEs that provide more specialized support when interpreting the findings of our interviews. As can be seen, there is an apparent diversity in reach and network heterogeneity among DHS COEs and components.

These metrics provide a visual depiction of the existence of interaction between the COEs to DHS components—essentially a measure of diversity or breadth in these connections. But it is important to note that these measures do not in any way capture the intensity of these connections. For instance, COEs which engage with a smaller number of components such as ADAC and CRC may work with those specific components very intensively in terms of projects, funding, and other forms of engagement.

FIGURE A.1

### COE and Component Mission Alignment and Support







# Supplementary Materials for Federal Program Review

This appendix provides additional methodological details and background findings for the federal programs review as a supplement to the content provided in Chapter 2. More specifically, it presents the processes for selecting federal programs for inclusion in the study, developing a discussion protocol, engaging interview participants, and analyzing interview data. This appendix also includes longer overviews of each federal program based on the completed document review and interviews.

## Additional Methodological Details

This section documents our federal program selection process, development of the discussion protocol, participant engagement strategy, and data analysis technique, which were summarized in Chapter 2.

### Federal Program Selection

As mentioned in Chapter 2, we initially identified 29 distinct programs across 17 federal departments and agencies for consideration. These programs were selected based on their alignment with the objectives and structures identified in our background research on university and government research partnerships. We gathered information on each program, including their missions and objectives, brief histories of their creation, and any related legal and/or Congressional foundations to their development and operation.

We then developed a matrix of factors for evaluating their potential inclusion to ensure we selected programs that represented a range of relevant characteristics. In developing the matrix, we identified how the federal agency or department manages its COE-type program, and, when possible, the processes for developing calls for proposals, selecting and establishing new centers, managing and evaluating centers, and for transitioning centers to a different status of the program once the COE's period of performance is complete. We also developed descriptions of any relationships between the selected federal program COEs and other federal government entities, universities, or other partners and of the types of research outputs

(e.g., technologies, workshops, projects, publications, etc.) from the COEs. Finally, we determined if the centers have workforce and professional development initiatives.

Developing the matrix was a critical step in whether a federal program was included in the study because many of the federal programs did not have sufficient publicly available documentation that provided basic information. Without that information, we were unable to assess viability for inclusion at the level of detail needed. As a result, federal programs that did not have publicly available information that defined their goals, missions, purposes, and funding structure were eliminated from further consideration.

For the matrix analysis, we wanted to ensure there were programs included that represented particular characteristics. Based on the research team's subject-matter expertise and sponsor input, we identified a set of factors for consideration:

- Funding sources (Congress/federal or university)
- Funding type (grants, cooperative agreement, contract/others)
- Types of partner relationships (university, federal, or community)
- Existence of academic performance measures
- Direct application of research to operational needs
- Existence of evaluation processes
- Existence of COE closures/transitions
- Significant program documentation exists
- Length of time program has been active (20+ years, 10–20 years, under 10 years)
- Consistency of program funding (continuous or inconsistent funding).

We completed the matrix by marking the factors in blue that are present in a federal program. We then selected 14 programs to represent a range of combined factors and ensure that our review included at least one program per factor (e.g., DOE's EFRCs are the only example of inconsistent funding). Table B.1 documents the completed matrix for the selected programs. As a final step, we created summary profiles for each federal program by combining the information from our matrix analysis with the program's goals, missions, and purpose. These profiles informed our discussion protocol development and interview sessions with federal program participants.

Upon completing the matrix, we created summary profiles for each federal program by combining the information from our matrix analysis with the program's goals, missions, and purpose. These profiles informed our discussion protocol development and first round of interview sessions with federal program participants. After completing the first round of interviews and analysis, however, we identified the need to engage participants from federal programs that used grants as a funding mechanism. We identified seven programs under HHS and NIH for inclusion in a second round of engagement. Table B.2 documents the total set of 36 federal programs across 19 federal agencies and departments considered for analysis, of which 21 federal programs across 11 federal departments and agencies were included in the review. Summary profiles were also created for each of the programs included in the second round of interviews and analysis.

TABLE B.1

Matrix Analysis of Selected Federal Programs

		Funding Sources		Types of Funding Structures			Types of Partner Relationships						Length of Time Active			Consistency of Funding			
		Congress/Federal	University	Contracts	Cooperative Agreement	Other	University	Federal	Community	Academic Performance	Direct Application of Research to Operational Needs	Existence of Evaluation Processes	Examples of COE Closures/Transitions	Significant Program Documentation	20+ Years	10-20 Years	Under 10 Years	Continuous Funding	Inconsistent Funding
CDC	PRCs	■				■				■				■				■	
DOE	EFRCs	■				■	■									■			■
FAA	Air Transportation COEs		■		■					■								■	
NIST	Advanced Materials COE	■				■				■				■				■	
	Community Resilience COE	■				■				■				■				■	
NOAA	NOAA Research Labs				■			■		■						■		■	
	NOAA CIs				■			■		■							■	■	
	NOAA Sea Grant				■			■		■					■			■	
NSF	CI CoEs					■				■							■	■	
	CCoE					■		■		■						■		■	
	National AI Research Institutes				■			■		■							■	■	
NIJ	FTCOE				■		■		■							■		■	
U.S. Army	UARCs			■					■					■		■		■	
U.S. Navy	UARCs			■					■					■				■	

**TABLE B.2**  
**Federal Programs Considered for Analysis**

Federal Agency or Department	COE or COE Program
Bureau of Ocean Energy Management	Environmental Studies Program
CDC	PRCs BOLD Public Health Programs
Department of Agriculture (USDA)	USDA COE
DOE	EFRCs
HHS	HRSA COEs SAMHSA SMMW-CoE
Department of Treasury	COEs Research Grants Program
FAA	Air Transportation COE
General Services Administration	IT Modernization COEs
National Aeronautics and Space Administration	University Research Centers Small Business Technology Transfer Program Minority University Research and Education Project
NIH	Maternal Health Research COEs NCI TRACE NHGRI CEER NIMHD Specialized COEs on Minority Health and Health Disparities
NIJ	FTCOE
NIST	Advanced Materials COE Community Resilience COE Forensic Science COE CCoE
NOAA	NOAA Research Labs NOAA CIs NOAA Sea Grant
NSF	Centers of Research Excellence in Science and Technology National AI Research Institutes CI CoEs CCoE
U.S. Air Force	Air Force COEs
U.S. Army	Army University Affiliated Research Centers
USCG	Blue Technology COE Cruise Ship National Center of Expertise
U.S. Navy	Navy University Affiliated Research Centers
Veterans Health Administration	Multiple Sclerosis COEs Epilepsy COEs

## Discussion Protocol

To develop a discussion protocol for federal program participants, we first reviewed the key factors for analysis in our review of OUP and its COEs. Understanding the relevant topics for analysis of the DHS COEs was critical to crafting discussion questions for federal program participants that would elicit information relevant to the study. Consequently, we developed questions on the structures, functions, and processes of the federal programs COEs. In preparation for each interview, we reviewed the information gathered through the selection process to identify gaps in our knowledge. Our semistructured interview approach allowed us to adapt the protocol to be specific to the participant's associated federal program.

At the start of each interview, the HSOAC interview lead, notetaker, and any other research team members who were present introduced themselves to the participant(s). The interview lead reviewed the consent protocol and requested verbal confirmation of consent from the participant(s) before proceeding with the interview. The interview lead used the discussion protocol to guide the discussion, though participants were also encouraged to raise relevant topics as they saw fit.

## Federal Program Discussion Protocol

### Introductions

- What is your title? What is your position/role at [federal program name]?

Thank you for providing that background information. We'd like to now focus on a few key topics related to the evaluation, funding, duration, and impacts of [federal program name]. We've prepared a series of questions to guide the discussion, but we encourage you to raise relevant issues or topics as you see fit during the session.

### Evaluation

- How was the evaluation process of proposals for [federal program name] developed?
- Please explain in some detail the proposal evaluation process.
  - What are the timelines for developing calls for proposals and evaluating submitted proposals?
  - What are the different steps in the process before funding is awarded?
- What criteria are used for the evaluation?
- What is the frequency of your evaluation process?
- What are the strengths of this evaluation process? What are the weaknesses?
- Is there any systemic linkage of the evaluation process to the [name of federal program/department/agency]'s mission or larger goals?

### Funding—Sources

- Please describe the sources of funding that support [name of federal program] and its affiliated centers.
  - Is funding from one or more sources?
  - Is funding consistently provided by the same source(s)?

- Does the consistency of funding impact the quantity or quality of research? And if yes, how?
- If [name of federal program] receives funding from sources other than [name of federal department/agency in which the federal program is housed], please describe the importance of nondepartment/agency-based funding for the quality and quantity of research.
- If [name of federal department/agency in which the federal program is housed] is the current primary source of funding for the affiliated centers, are there any plans or expectations for the centers to transition to other funding sources over their respective durations?

#### Funding—Mechanism and Schedule

- Please describe the funding mechanism(s) used to provide support to the [name of federal program]’s affiliated centers. Examples of funding mechanisms are: cooperative agreements, grants, BOAs and different types of contracts.
  - What are the reasons this funding mechanism was chosen?
  - Has another funding mechanism been used previously, and if so, what are the reasons for the switch? If more than one funding vehicle is concurrently employed, can you explain the reasoning?
- What does the funding schedule look like?
  - What are the reasons for choosing this funding schedule, and what are the benefits or challenges of this schedule for recipients?

#### Expected Duration of Affiliated Centers

- Can you confirm the nature of the award cycle (i.e., competitive versus noncompetitive, duration)?
  - What does it mean to have a competitive/noncompetitive opportunity?
  - What is [federal program’s] philosophy for how NOFOs are run (e.g., prioritizing long-term relationships, or something different)?
- How often do centers recompile or renew?
- How long have centers existed (i.e., a range across all centers/number of renewals or successful recompetes)?
  - For centers that have existed for a long time, what justification would you offer for their long-term existence?
  - Who are your outside stakeholders, and what are their perspectives on how many times a center is awarded (i.e., awarded few times versus repeated awards with the same individuals)?
- Have any centers affiliated with this program been discontinued and/or removed from [name of federal program]’s funding stream?
  - How was that decision made?
  - What was the process like?
  - Did the affected center’s research continue through a different program, center, or organization?

- Who is being awarded each time (same or different researchers or institutions)?
  - What are the associated benefits and challenges?
- How often is the federal program developing a new partnership versus maintaining existing ones?
  - What is the impact to the success of the [federal program]?
- What are the drivers for the scope and type of research questions in NOFOs/RFPs (e.g., specific versus broad questions; consider factors related to technology, political environment, other)?
- How do research topics stay the same or change with each renewal or recompetete?
  - If research topics change over time, what makes a COE better positioned to pivot to a new focus (e.g., relationships, flexibility in contracting, other)?
- What happens if a research topic ends?
  - The work?
  - The relationship?

### Impacts

- Has [name of federal program] identified any metrics by which to measure the impacts of the program and its affiliated centers?
  - Number and/or value of academic contributions or partnerships?
  - Number and/or value of developed technologies or products?
  - Number and/or value of technologies transitioned and/or commercialized?
  - Metrics related to any workforce development initiatives
- Are there any metrics by which to measure the broader impacts of [name of federal program] on [name of federal department/agency in which the federal program is housed]?
  - If so, could you share those metrics with us, including any variation across them over time?
- (For affiliated centers that develop technology) Has any technology initially developed within the affiliated center(s) been transferred to either industry or a federal laboratory for further development?

Before we wrap up the session, we'd like to ask, are there any topics or questions that we did not touch upon in our discussion today but that you think are worthy of our attention?

### Participant Engagement

In addition to our review of publicly available materials for the selected federal programs, we identified personnel within each organization for engagement. We initially reached out to 29 potential participants, based on their current or former leadership roles within the 14 identified federal programs and affiliated centers. More specifically, we sought participants placed at the highest level of organizational management within the federal department or agency who directly involved with the selected COE program and within the COE. Using a snowball sampling method, we asked potential participants to recommend others who fit the study criteria and might be willing to meet with the research team. Through this

method, we identified an additional 16 potential participants. To further examine specific topics, we asked five participants to be reinterviewed and identified 26 new participants from seven additional federal programs. Our total outreach to 71 potential participants yielded 24 engaged participants (34% response rate) from 15 distinct programs, whom we engaged in 21 virtual interview sessions.

## Interview Data Analysis

Using the information collected in Task 1, we completed a targeted qualitative data analysis to identify lessons learned, best practices, and recommendations for OUP's way forward. To identify, examine, and interpret patterns and themes in textual data and to determine how these patterns and themes help answer the research questions, we used an emergent coding technique. We first independently identified themes during a preliminary examination of the notes from interviews with federal program participants. Then, we compared and discussed those themes to reconcile any differences and develop a set of larger themes and definitions in a codebook (Table B.3). These topics formed the basis of the analysis for the interview set.

Using the federal program codebook, a group of three to four researchers independently evaluated and identified the presence of topics within a sample of each of the interview sets. They then compared their results to determine their IRR. The percent of agreement was calculated across all pairs of researchers within each interview set, and an acceptable threshold was 70% with a preferred threshold of 80% for the first round of interviews. Groups who achieved an IRR lower than these thresholds revisited the codebook, converged on understanding of topics, and repeated the sample coding until their IRR was acceptable. An average IRR value

**TABLE B.3**  
**Codebook and Results for Analysis of Federal Program Interview Data**

Level 1 Code	Level 2 Code	Level 3 Code	
Evaluation (N=16) Processes for review and feedback by the Center funders and project sponsors	<b>Development of the proposal process (N=12)</b> Participant discusses proposal process (e.g., the development of funding announcement, selection of themes or identification of initial aims for the program)	<b>Positive (N=1)</b> Participant reflects positively on evaluation  <b>Negative (N=1)</b> Participant reflects negatively on evaluation	
	<b>Proposal evaluation process (N=15)</b> Participant discusses the review of initial or renewal proposal applications (e.g., steps, timeline, requirements)	<b>Positive (N=1)</b> Participant reflects positively on evaluation  <b>Negative (N=4)</b> Participant reflects negatively on evaluation	
	<b>Center evaluation (N=15)</b> Participant discusses evaluation of the center (e.g., criteria, frequency, linkages to goals)	<b>Positive (N=2)</b> Participant reflects positively on evaluation  <b>Negative (N=2)</b> Participant reflects negatively on evaluation	



**Table B.3—Continued**

Level 1 Code	Level 2 Code	Level 3 Code
<p><b>Funding—Sources (N=16)</b> Participant experience with Center funding sources</p>	<p><b>Primary federal agency funding source (N=15)</b> Funding consistency, impacts to quality/quantity of research/funding mechanism</p>	<p><b>Positive (N=4)</b> Participant reflects positively on the funding for Center</p> <p><b>Negative (N=2)</b> Participant reflects negatively on the funding for Center</p>
	<p><b>Other funding streams from primary federal agency funding source (N=7)</b> (e.g., NOAA research lab receives funding from other NOAA program or office) Funding consistency, impacts to quality/quantity of research/funding mechanism</p>	<p><b>Positive (N=0)</b> Participant reflects positively on the funding for Center</p> <p><b>Negative (N=1)</b> Participant reflects negatively on the funding for Center</p>
	<p><b>External funding (N=11)</b> Funding consistency, impacts to quality/quantity of research/funding mechanism related to funding received from sources other than primary federal agency</p>	<p><b>Positive (N=2)</b> Participant reflects positively on the funding for Center</p> <p><b>Negative (N=1)</b> Participant reflects negatively on the funding for Center</p>
	<p><b>Sunsetting/Planning horizon (N=7)</b> Notes on the expected end of funding for the Center</p>	<p><b>Positive (N=0)</b> Participant reflects positively on the funding for Center</p> <p><b>Negative (N=1)</b> Participant reflects negatively on the funding for Center</p>
	<p><b>Center Duration (N=16)</b> Participant knowledge of duration of Center</p>	<p><b>Expected Duration (N=15)</b> Center and program expectations for Center duration (e.g., defined duration, potential for renewal or recompetete)</p>
<p><b>Decisionmaking Processes (N=8)</b> How decision was made for duration, renewal, recompetete, etc.</p>		<p><b>Positive (N=1)</b> Participant reflects positively on the length of support for Center</p> <p><b>Negative (N=2)</b> Participants reflects negatively on the length of support for Center</p>
<p><b>Effects of Duration (N=13)</b> Participant discusses effects of Center duration on research productivity, quality, personnel, etc.</p>		<p><b>Positive (N=5)</b> Participant reflects positively on the length of support for Center</p> <p><b>Negative (N=2)</b> Participants reflects negatively on the length of support for Center</p>

**Table B.3—Continued**

Level 1 Code	Level 2 Code	Level 3 Code
Outcomes (N=12) Technical and nontechnical	<b>Academic contributions (N=9)</b> Center's contribution of papers, conferences, students, institutional collaboration, curriculum, degree programs	<b>Positive (N=2)</b> Participant reflects positively on outcomes  <b>Negative (N=0)</b> Participant reflects negatively on outcomes
	<b>Tech transition (N=6)</b> Transition to sponsors or further afield (e.g., industry) and related experiences like data generation, use, or sharing of foundational data between the Center and the Sponsors or end users of the technology	<b>Positive (N=2)</b> Participant reflects positively on outcomes  <b>Negative (N=1)</b> Participant reflects negatively on outcomes
	<b>Workforce development (N=12)</b> Pipeline, DEI initiatives, who they hire, internships, professional development	<b>Positive (N=3)</b> Participant reflects positively on outcomes  <b>Negative (N=1)</b> Participant reflects negatively on outcomes
	<b>Broader impacts (N=13)</b> Influence of Center activities on the larger community or the public	<b>Positive (N=5)</b> Participant reflects positively on outcomes  <b>Negative (N=0)</b> Participant reflects negatively on outcomes
Engagement (N=12) Awareness, relationships, communication, and collaborations	<b>Federal program administration (N=11)</b> Communication, coordination, collaboration, and oversight between the managers at the sponsoring agency and the Center	<b>Positive (N=4)</b> Awareness, relationships, communication, and collaborations  <b>Negative (N=0)</b> Participant reflects negatively on these engagement processes or relationships
	<b>Research collaboration (N=9)</b> Communication, coordination, collaboration between the Center and other researchers (e.g., within federal agency, other government programs, academia, industry, etc.)	<b>Positive (N=6)</b> Awareness, relationships, communication, and collaborations  <b>Negative (N=3)</b> Participant reflects negatively on these engagement processes or relationships
	<b>Center Engagement with End Users (N=7)</b> Communication, coordination, collaboration between the Center and users of its products	<b>Positive (N=0)</b> Awareness, relationships, communication, and collaborations  <b>Negative (N=0)</b> Participant reflects negatively on these engagement processes or relationships

**Table B.3—Continued**

Level 1 Code	Level 2 Code	Level 3 Code
<b>Funding—Mechanism and Schedule (N=10)</b> Participant experience with Center funding mechanisms and funding schedules	<b>Funding Mechanisms (N=10)</b> Funding mechanisms, funding vehicles, motivation behind funding vehicles	<b>Positive (N=7)</b> Participant reflects positively on the funding for Center  <b>Negative (N=3)</b> Participant reflects negatively on the funding for Center
	<b>Funding Schedule (N=7)</b> Funding schedule, motivation behind funding schedules	<b>Positive (N=1)</b> Participant reflects positively on the funding for Center  <b>Negative (N=4)</b> Participant reflects negatively on the funding for Center
<b>Award Cycle (N=10)</b> Participant experience with Center award cycles, recipients, research topics, and partnerships	<b>Type of Cycle (N=9)</b> Type of award (i.e., competitive versus noncompetitive, type of award cycle (i.e., recomplete versus renewal)	<b>Positive (N=2)</b> Participant reflects positively on type of award cycle  <b>Negative (N=1)</b> Participant reflects negatively on type of award cycle
	<b>Recipients (N=8)</b> Recipients of award (i.e., returning versus new recipients), stakeholder perception of recipients	<b>Positive (N=1)</b> Participant reflects positively on award recipients  <b>Negative (N=0)</b> Participant reflects negatively on award recipients
<b>Award Cycle (N=10)</b> Participant experience with Center award cycles, recipients, research topics, and partnerships (continued)	<b>Research Topics (N=6)</b> Scope and type of research questions, changing of topics over time	<b>Positive (N=1)</b> Participant reflects positively on research topics  <b>Negative (N=0)</b> Participant reflects negatively on research topics
	<b>Partnerships (N=8)</b> Establishing new partnerships, maintaining existing partnerships	<b>Positive (N=3)</b> Participant reflects positively on partnerships  <b>Negative (N=1)</b> Participant reflects negatively on partnerships

NOTE: For the Level 1 and 2 codes, “N” documents the number of interview sessions in which participants discussed the identified topic. For the Level 3 codes, “N” documents the number of interview sessions in which participants discussed the Level 1 and Level 2 codes and expressed a corresponding positive and/or negative sentiment.

of 80% was achieved, and ten of 13 coding pairs exceeded the preferred threshold for the first round of interviews. IRR was similarly calculated for coding data collected during the second round of interviews. An average IRR value of 81.6% was achieved. Both the frequency count of each topic and the content within were captured during the analysis and shared in this report. Content included information about aspects of the topic that were important to respondents, as well as whether they shared a positive and/or negative perspective about the topic.

## Additional Background

This section documents supplementary information to the brief overviews of each selected federal program from Chapter 4, which was gathered during the document review and interviews.

### CDC Prevention Research Centers

The CDC runs a Congressionally mandated program of PRCs. The program was established in 1986, and is composed of 26 university-based programs, as of July 2023 (PRC, undated). PRCs are funded for five years and can be recompleted but not renewed. Proposals are selected based on a Scientific Merit Review by external reviewers and a Secondary Review Committee composed of senior agency staff at CDC (PRC, 2023).

PRCs are funded by cooperative agreements and supplemental funding awards called Special Interest Projects (SIPs). SIPs are only available to PRCs and are intended to focus on topics of interest or gaps in knowledge (PRC, undated). A 2017 U.S. Government Accountability Office (GAO) report found that CDC officials would choose to use the SIP mechanism over the cooperative agreement when the research involved community-based projects, or to seek access to particular researchers in the PRC network. The SIP mechanism would not be chosen when the research is clinical or laboratory-based, not suited for an academic center, or better funded by a contract (GAO, 2017). The report also found that the main advantage of using SIPs was the ability to rapidly initiate research, due to existing research infrastructure and community relationships established at the PRCs. However, some disadvantages of using SIPs include reduced access to expertise outside the PRCs (GAO, 2017). PRCs are managed at the center level by CDC officials, who manage center evaluations. To support evaluation, PRCs are required to submit an annual report, which serves as the research performance progress report (RPPR)<sup>1</sup> (PRC, 2023).

### CDC BOLD Public Health Programs

The CDC National Center for Chronic Disease Prevention and Health Promotion runs the BOLD Public Health Programs to Address Alzheimer’s Disease and Related Dementias. Starting in 2020, CDC has funded three PHCoEs. PHCoEs are meant to act as a resource for

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<sup>1</sup> The RPPR is used more broadly by NIH to document progress on grants (NIH, undated).

BOLD Public Health Programs, which are a set of 43 distinct public health departments also funded by the CDC to build infrastructure and expand capacity in the field of Alzheimer’s Disease and Related Dementias (CDC, 2021). The first cohort of BOLD Public Health Programs was awarded in 2023 (CDC, 2023a). Both PHCoEs and Public Health Programs are awarded for a five-year period of performance (CDC, 2020). However, Public Health Programs are divided into either Component 1 or Component 2 awards. Component 1 awards are intended for applicants without a current jurisdiction or active dementia coalition, while Component 2 awards are intended for those that have an active dementia coalition and strategic plan in place (CDC, 2023a). Component 1 awards are further split into 2 “Capacity-Building” years (Phase I) and 3 “Implementation” years (Phase II) (CDC, 2023b). Component 2 awards are funded for 5 “Implementation” years (CDC, 2023b). After the five-year period of performance, PHCoEs and Public Health Programs will be recompeted. Proposals are selected based on a multi-phase review process of an applicant’s research approach, evaluation and performance measurements, and organizational capacity (CDC, 2023b).

Both PHCoEs and Public Health Programs are funded via U58 cooperative agreements.<sup>2</sup> PHCoEs are awarded for approximately \$500,000 per year and Public Health Programs are awarded for approximately \$450,000 per year (CDC, 2020; CDC, 2023b). Recipients are required to submit a Recipient Evaluation and Performance Measurement Plan and a Data Management Plan six months into the award, an Annual Performance Report, and a Final Performance and Financial Report at the end of the period of performance (CDC, 2023b).

## DOE Energy Frontier Research Centers

The DOE runs a program of EFRCs. Since the program began in 2009, the Office of Basic Energy Sciences (BES) has funded a total of 104 centers, which can be led by either a university or a national laboratory (DOE, undated-b). As of July 2023, there are 51 active EFRCs, of which 39 are led by universities and 12 are led by national laboratories (DOE, undated-a). New EFRCs are funded for an initial four-year period of performance. Every two years, the DOE runs an open recompetition of awards to either establish new four-year centers, fund two-year “extensions,” or fund four-year “renewals” (DOE, undated-b). While applications are separated into new applications and renewal applications, they are both competed together (DOE, 2021, Section VIII). For renewal applications, the DOE may also choose to fund a two-year extension rather than for the full four-year renewal (DOE, 2021, Section II).<sup>3</sup> Applications are selected based on a merit review of responsiveness to objectives, scientific merit, appropriateness of research, and likelihood of scientific impact (DOE, 2021, Section IV).

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<sup>2</sup> For more information about U58 cooperative agreements, see NIH (undated).

<sup>3</sup> The two-year extensions are most similar to center renewals in other federal programs, and the four-year renewals are most similar to center recompetitions in other federal programs.

EFRCs are funded by grants and cooperative agreements. A center's funding is determined by a merit review during the proposal review stage, within a defined floor and ceiling. EFRCs are managed by a team of program managers from BES Divisions, who serve as the principal point of contact for each EFRC. During the center's period of performance, EFRCs are required to submit a RPPR that include center accomplishments, products, and impacts (DOE, 2017).

## HRSA Centers of Excellence

HRSA runs a COE program. The program was established in 2015, when HRSA funded 24 COEs (HRSA, undated). As of November 2021, HRSA plans to fund 15 recipients during their next cycle in 2022 (HRSA, 2021). Centers are awarded for a five-year period of performance, with the potential for recompetition (HRSA, 2021). COEs are selected based on a technical merit assessment, which includes the purpose and need of the center, research plan methodology, research impact, and organizational capabilities (HRSA, 2021).

HRSA COEs are funded by grants of approximately \$686,000 per award (HRSA, 2021). Centers are required to submit an Annual Progress Report to HRSA and a Quarterly Progress Update to HRSA each quarter, along with an Annual Performance Reports and a Final Program Report upon completion of the center's period of performance (HRSA, 2021). It should be noted that student involvement and workforce development appear to be an integral part of COEs, and the Center program runs on the Academic Year schedule, including for reporting deadlines and program activities (HRSA, 2021).

## SAMHSA Center of Excellence on Social Media and Mental Wellbeing

SAMHSA runs SMMW-CoE. The COE was established in 2022 and awarded to the American Academy of Pediatrics (SAMHSA, 2022b). Centers are awarded for a five-year period of performance, but it is unclear if centers are allowed to be renewed or recompleted (SAMHSA, 2022a). Centers are selected based on a peer-review of the merit of each application (SAMHSA, 2022a). Other important considerations include the equitable distribution of awards in terms of geography and the availability of funds (SAMHSA, 2022a).

The COE is funded by a cooperative agreement of up to \$2 million per year (SAMHSA, 2022a). During the COE's period of performance, the COE primarily works with the SAMHSA Project Director, subject-matter experts, and the technical expert panel. The COE also submits an annual progress report which addresses the program's data and progress for performance measures, key program accomplishments, description of changes, challenges and problems encountered, and evaluation activities for tracking efforts (SAMHSA, 2022a). Furthermore, workforce development is a key role of the center, and the center is required to report performance on workforce development measures and training measures (SAMHSA, 2022a). A final cumulative performance report is submitted at the end of the period of performance (SAMHSA, 2022a).

## FAA Air Transportation Centers of Excellence

FAA runs a congressionally mandated program of Air Transportations COEs. Since its start in 1993, the program has designated 13 COEs, including six active centers as of July 2023 and seven centers that have experienced replacement through recompetition or transitioned into self-sufficiency or closure (FAA, undated-a). COEs are initially selected for a five-year period of performance with the potential for a five-year renewal if the host university remains in good standing. A university's standing is determined by an internal research performance review at the five-year mark. There is some flexibility in the period of performance for project extensions, and adjustments were made for some COEs to accommodate for funding challenges due to the 2019 coronavirus disease pandemic. The FAA COEs were not designed to be legacy programs, and ideally COEs close out after ten years and are sustainable without federal funding.

During the COEs' period of performance, they are funded via a cooperative agreement with the FAA sponsoring office and a required one-to-one matching contribution from any non-federal source or combination of sources (e.g., in-kind, actual dollar, private money, non-profit money, university money, state government money, etc.) (FAA, undated-b). The motivation of FAA to require a one-to-one matching contribution is to get universities that are partners rather than grant recipients, and to help universities develop strong relationships with other universities and industry partners. In addition to base funding, the COEs may obtain procurement contracts for particular tasks. At the COE level, COEs are managed on a project basis by technical program managers who have technical aviation background in the area of their assigned COE and facilitate interaction between the COE and FAA. COEs are also required to submit to the FAA an annual report that includes a performance evaluation, a matching cost share evaluation, a research development and results evaluation, and a dissemination and publicizing evaluation.

## NIJ Forensic Technology Center of Excellence

NIJ runs FTCOE currently led by the forensic science division of RTI International, a non-profit which works with academia, industry, and crime laboratories (FTCOE, undated). The center focuses on research, development, testing, and evaluation of emerging forensic technologies.<sup>4</sup> COEs are selected through a competitive solicitation every five years, and RTI has been awarded the last three cycles since 2012 (FTCOE, undated). The decision of NIJ to run a five-year program is in part due concerns about the ability of a longer-term incumbent institution to outcompete all other institutions in a particularly niche forensic science field.

During the COE's period of performance, it is funded by a cooperative agreement with the NIJ Office of Justice Programs (NIJ, 2021). The NIJ provides direction on the annual project selection of the center and provides oversight through an assigned program manager who

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<sup>4</sup> An additional focus of RTI is on technology transition and knowledge transfer elements, such as with the dissemination of publications, creation of translational products like webinars, and outreach engagements like symposiums.

has expertise in the technical area of the center. In addition, the NIJ holds a weekly hour-long session with the center for interim progress reports. The center also provides to the program manager reporting of performance metrics and project successes, as well as project plans to facilitate technology transition.

## NIH Maternal Health Research Centers of Excellence

NIH runs the Maternal Health Research Centers of Excellence as part of the IMPROVE initiative (NIH, 2023b). The program was recently established in 2022. There are currently ten active centers, one Data Innovation and Coordinating Hub, and one Implementation Science Hub, as of November 2023 (NIH, 2023b). The Data Innovation hub was created to aggregate and glean data in support of the ten active centers. Data Innovation hubs are used routinely across NIH, since they provide benefits for rapid detection of signals across multiple clinical trial sites. The Implementation Science hub was created to broker relationships with communities of interest and improve dissemination of findings to those communities. Both the Data Innovation and Implementation Science hubs were stood up to serve the whole COE network as a resource. Maternal Health Centers of Excellence have a period of performance of seven years (NIH, 2023b). Two years before the end of a center's period of performance, NIH decides to either recompetite the center, terminate the center, or redesign the center, based on the center's performance and deliverables. If a center is terminated, the Data Innovation center facilitates the collection and sharing of research products from the terminated center to NIH. Center proposals are selected based on a standard NIH process that involves a scientific review by external reviewers and a review of the portfolio of research topic. Moreover, an important consideration for proposals was the inclusion of certain populations and local communities.

Active centers are funded by U54 cooperative agreements while the Data Innovation and Implementation Science hubs are funded by U24 cooperative agreements (NIH, 2022a; NIH, 2022b; NIH, 2022c).<sup>5</sup> To facilitate NIH involvement in the centers, NIH embeds an NIH project scientist and an NIH program official to work with the center to monitor study progress and provide grant administrative support, respectively (NIH, 2022a). Moreover, recipients are required to submit annual RPPRs and financial statements. A final RPPR is required at award closeout and NIH will review and measure the performance of the center based on the final RPPR (NIH, 2022a).

## NCI Telehealth Research Centers of Excellence

NCI runs the NCI TRACE. TRACE is a new program that started in 2021 and they support four active COEs, as of May 2023 (NCI, 2023). TRACE centers are funded for a five-year period of performance with no potential for center renewal (NCI, 2021). Proposals are selected based on a NIH peer-reviewed evaluation for scientific and technical merit, which includes a scientific peer review (NCI, 2021). Moreover, TRACE centers must establish an

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<sup>5</sup> For more information on U54 and U24 cooperative agreements, see NIH (undated).



Administrative Core, with one of its goals to promote opportunities for graduate students, postdoctoral researchers, and investigators in early stages of independent careers to participate in the Center’s activities (NCI, 2021).

TRACE centers are funded by P50 Specialized Center grants (NCI, 2021). The level of funding is different for each center, depending on the scientific merit of proposed projects, availability of funds, and the relevance of proposed projects to NCI priorities (NCI, 2021). TRACE centers are evaluated throughout their period of performance through an annual RPPR (NCI, 2021). To support research planning, TRACE centers establish an external advisory board of key stakeholders, which provides scientific, planning, evaluation, and dissemination expertise to Center leadership (NCI, 2021).

## NHGRI Center of Excellence in ELSI Research

The NHGRI ELSI Research Program runs CEER. Since its start in 2004, the program has awarded five Exploratory Center grants and 11 Full Center grants, including to four active centers, as of January 2019 (NHGRI, 2019). Exploratory centers are funded for a three-year period of performance with no potential for renewal (NIH, 2012). However, exploratory centers “graduate” upon completing their three-year period of performance and can further apply for full center grants. The decision for exploratory centers came out of an acknowledgement that these will conduct early phase research, in which applicants may not already have the preliminary data necessary to be competitive for a NIH’s largest R01 research grant. Full centers are funded for a four-year period of performance. Several previous full centers were funded for a five-year period of performance, but NHGRI later decided that a four-year period of performance was sufficient. Full centers also have the potential for one four-year competitive renewal,<sup>6</sup> in an open competition with exploratory centers and new applications (NIH, 2017). Full CEERs were renewed more often than not, and 9 out of 11 full centers have experienced center renewal. After the renewal period of performance, there is no definite path for centers. Some previous centers have continued on to apply for other types of grants (e.g., training grants and research grants) and other centers have not continued on. Center proposals are awarded based on an NIH peer-reviewed evaluation of scientific and technical merit, with input from subject-matter experts and an advisory council (NIH, 2017). However, review criteria are different for exploratory and full centers, and there are fewer criteria for an exploratory center.

Since 2004, NHGRI has utilized three separate vehicles to fund CEERs. Exploratory centers are funded by P20 Exploratory Center Grants. Full centers were initially funded under the P50 Specialized Center Grant, but later switched to the RM1 Collaborative Program Grant for Multidisciplinary Teams.<sup>7</sup> The motivation behind the switch was mainly administrative, and interviewees noted that the many parts to the P50 grants had become too cumbersome and challenging to review. While the switch did not change the emphasis or focus of the

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<sup>6</sup> The renewal application is available only to grantees funded under the previous award cycle (NIH, 2019).

<sup>7</sup> For more information about RM1 grants, see NIH (2023a). For more information about P20 and P50 grants, see NIH (undated).

center, language was revised in order to continue to accommodate workforce development and training within the RM1 mechanism. Full centers are currently funded by standard RM1 grants of around \$4 million over their four-year period of performance (NHGRI, 2019). Full centers may also receive additional funding through research project (R01), small research (R03), and exploratory research (R21) grants.<sup>8</sup> NHGRI follows a standard NIH process for annual monitoring of CEERs. CEERs submit an annual review report, in which they report out on defined metrics (e.g., number of publications, conferences attended).

## NIMHD Specialized Centers of Excellence on Minority Health and Health Disparities

NIMHD runs Specialized COEs on Minority Health and Health Disparities, which were established by the Minority Health and Health Disparities Research and Education Act of 2000 (Public Law 106-525, 2000). The first centers were awarded in 2002 (NCMHD, 2002). As of November 2023, there are 12 centers that have been active since 2017 (NIMHD, undated). Centers are funded for a five-year period of performance with the potential for competitive renewals, in which returning centers are competed alongside new applications (NIMHD, 2017). Centers are selected based on a peer-reviewed evaluation of scientific and technical merit.

Current NIMHD centers are funded by U54 cooperative agreements (NIMHD, 2017). Over five years, the total award amount is approximately \$82 million (NIMHD, 2017). It should be noted that previous centers have been funded under the P60 Comprehensive Center Award mechanism.<sup>9</sup> However, we could not identify any motivations behind the switch. To facilitate NIMHD involvement in the centers, a project scientist and a program official from NIMHD are embedded within each center. Project scientists review critical stages in program implementation and program officials evaluate progress from technical/fiscal reports (NIMHD, 2017). Moreover, recipients are required to submit annual RPPRs and financial statements. A final RPPR is required at award closeout and NIH will review and measure the performance of the center based on the final RPPR (NIMHD, 2017).

## NIST Advanced Materials Center of Excellence

NIST runs an Advanced Materials COE called CHiMaD, created in response to the national MGI (National Science and Technology Council, 2011).<sup>10</sup> Awarded in December 2013, ChiMaD is a consortium composed of two universities, a national laboratory, and a small business (CHiMaD, undated). The center was selected for an initial five-year period of performance with the potential for one five-year renewal (NIST, 2018). Renewal of the center was

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<sup>8</sup> For more information about R01, R03, and R21 grants, see NIH (undated).

<sup>9</sup> For more information about previous NIMHD centers, see National Center on Minority Health and Health Disparities (NCMHD, 2002); National Center on Minority Health and Health Disparities (NCMHD, 2008); NIMHD (2011).

<sup>10</sup> The most recent MGI Strategic Plan was released in 2021 (see National Science and Technology Council, 2021).

granted in 2018 based on a NIST evaluation of the center's performance, continued relevance, and availability of funds (Advanced Materials Center of Excellence, 2018). As of July 2023, there is no mechanism to continue a center past 10 years.

During the center's period of performance, it is funded by a cooperative agreement with NIST. The center's funding also includes a significant outreach budget dedicated for outreach and education programs, including for high school summer camps, training of teachers, and distribution of software. The center is managed on a project basis where there is extensive interaction between NIST and the group of faculty members at ChiMaD. At the center level, interaction with NIST happens in the context of the annual review, which is a 2-day meeting to bring NIST and the industry advisory committee together and solicit feedback from both groups. In addition, the center submits an annual report to NIST, which describes the center's accomplishments, developed products, and outreach and education programs (CHiMaD, 2021).

## NIST Community Resilience

NIST runs a Community Resilience COE currently led by Colorado State University to design and develop the Interdependent Networked-Community Resilience Modeling Environment (Colorado State University, undated). The center was awarded in February 2015 for an initial five-year period of performance with the potential for one five-year renewal (NIST, undated). Renewal of the center was granted in 2020 based on a NIST evaluation of the center's performance, continued relevance, and availability of funds (Community Resilience Center of Excellence, 2014). After five years, the center was expected to be renewed. After ten years, the center is expected to be sustainable and will be no longer maintained as a NIST center.

During the center's period of performance, it is funded by a cooperative agreement with NIST, which requires the center to submit semiannual reports and hold semiannual meetings. In the first five-year period, the center was focused on developing foundational science, while in the second five-year renewal period, the center was focused on implementation and application. The center is also directed by an External Assessment Panel (EAP), which attends the semiannual meeting, and is composed of a multidisciplinary group representing people from a variety of sectors, including academia, engineering, consulting, and social science. The center has the ability to accept or decline the EAP's recommendations at their discretion. At the project level, the center closely collaborates with NIST by integrating NIST staff onto project teams, allowing for jointly produced journal publications and held conferences. About 70% of the center's projects currently integrate NIST in this way.

## NOAA Research Laboratories

NOAA runs a set of ten federal laboratories that are a part of the Office of Oceanic and Atmospheric Research (OAR) Line Office (NOAA, undated). The NOAA Laboratories are internal to the agency and are not awards. Every five years, the labs undergo a scientific evaluation to assess the quality, relevance, and performance of research. Each review is conducted by a panel of independent peer reviewers who are identified by each NOAA Lab.

NOAA Labs are funded by a combination of base funding and soft money from other NOAA or external sources (Physical Science Laboratories, 2020). Base funding is used for nondiscretionary costs, while external funding is used to support research. Moreover, funding varies from year to year based on the Congressional budget. While the NOAA Labs have little to no ability to influence the base funding, senior leaders at the Line Office level in OAR develop a strategy that influences the determination of budget and resources (NOAA, 2020).<sup>11</sup> In addition, NOAA Laboratories all have close relationships with universities, and have established cooperative agreements with CIs.<sup>12</sup>

## NOAA Cooperative Institutes

NOAA runs a program of CIs led by academic institutions and are often collocated with NOAA Research Laboratories (NCEI, 2018). As of July 2023, NOAA funds 19 CIs (CI, undated-b). CIs are awarded for a five-year period of performance, with the potential for a five-year renewal if the university remains in good standing. A university is determined to be in good standing based on a scientific and administrative review held in year four of the initial five-year award period (NOAA, 2013, Chapter 2C). At the end of the renewal period after ten years, CIs can either re compete for a new CI award or are sunsetted. If a CI is sunsetted, the CI is notified 18 months before the end of the award and there is close collaboration with NOAA to develop a sunset plan. NOAA allows an additional sunset period of one year after the end of the award and may provide supplemental funding to complete research projects or transfer research to another CI. (NOAA, 2013, Chapter 6B).

NOAA CIs are funded by cooperative agreements with a responsible Line Office, and CIs currently support three Line Offices, as of July 2023 (CI, undated-a). The CI is managed by a Line Office CI Program Manager, who serves as the primary point of contact between the CI and the Line Office (NOAA, 2013, Chapter 4A). During a CI's period of performance, it is required to submit an annual performance progress report (NOAA, 2013, Chapter 4L). In addition, NOAA facilitates a 2–3 day annual meeting with all CI directors and all Line Office CI Program Managers to discuss CI research, NOAA research plans, grants management, organizational changes, and other topics of importance (NOAA, 2013, Chapter 4K).

## NOAA Sea Grant

NOAA runs a Congressionally mandated Sea Grant program through NSGO (U.S. Code, Title 33, Section 1121 et seq). The program was established in 1966 and is composed of a network of 34 university-based programs, as of July 2023 (Sea Grant, undated). Sea Grants programs are awarded for four-years and can be recertified for an additional four years, with no limit on the number of recertifications (NSGO, 2022). Program recertification is deter-

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<sup>11</sup> An extension to the OAR strategy is the OAR implementation plan, which is used to guide budget planning and discussions (see NOAA, 2021).

<sup>12</sup> See next section on NOAA CIs.

mined based on a full cycle NSGO review, which takes place at the end of the four-year implementation phase<sup>13</sup> (NSGO, 2022). Sea Grant programs are expected to be recertified every four years, and many programs have been in place for decades.

NOAA Sea Grant programs are funded by cooperative agreements with NOAA and additional merit funding (Sea Grant, 2022). Merit funds are determined by a merit score that is assigned during NSGO review for recertification (NSGO, 2022). Merit funding typically accounts for ten percent of the total appropriation, and assigning merit scores helps in Congressional budget justifications. Sea Grant programs are managed on a center level by an assigned federal program officer. The program officer conducts the full cycle evaluation, which includes a site visit, an external evaluation, and the full cycle NSGO Review. In addition to the full cycle evaluation, the program officer holds a midcycle NSGO review discussion after year three of implementation. Sea Grant programs also submit annual progress reports to the program officer through an online database, Planning, Implementation, and Evaluation Resources, which serves as a repository for all Sea Grant annual reports (NSGO, 2022).

## NSF National AI Research Institutes

NSF runs a program of AI Institutes that was created in response to the publication of the National AI Research and Development Strategic Plan (National Science and Technology Council, 2016).<sup>14</sup> The program started in 2019 with 18 institutes and has grown to 25 institutes, as of July 2023. Competitions for new institutes are conducted every two years and proposals are required to be aligned to a theme defined in the program solicitation.<sup>15</sup> Institutes are awarded for a five-year period of performance (National AI Research Institutes, undated). After five years, institutes are expected to either be self-sufficient, renew for an additional five years if the institute remains in good standing, or ramp down toward sustainability with a reduced budget for a specific task, such as for technology transfer. Institutes remain in good standing based on an evaluation with the following criteria: quality and outputs of foundational research, effectiveness of use-inspired research, activities for workforce development, multidisciplinary nature of research efforts, and nexus point activities (National AI Research Institutes, undated).<sup>16</sup>

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<sup>13</sup> Sea Grant programs follow a three-phase timeline called the Planning, Implementation, and Evaluation system. The four-year period of performance is termed the “implementation” phase. During the last two years of the implementation phase, a “planning” phase is started for the next implementation cycle. At the beginning of the next implementation cycle, a two-year “full cycle evaluation” is started for the previous four-year implementation phase (NSGO, 2022).

<sup>14</sup> The National AI R&D Strategic Plan was published in October 2016 and updates were made in June 2019 and May 2023.

<sup>15</sup> Due to ramp up of the program, cohorts of institutes were added in 2020, 2021, and 2023.

<sup>16</sup> An example of a multidisciplinary and integrated nexus point activity is the creation of the AI Virtual Organization, which hosts annual PI meetings and workshops attended by key personnel and representatives from funding partners, recognizes and funds special interest groups, and aggregates social media for a broader community.

The NSF funds 20 institutes via a cooperative agreement with a combination of funds from outside funding partners.<sup>17</sup> USDA National Institute of Food and Agriculture (NIFA) directly funds five institutes with only NIFA funds. The funding partners are also required to be aligned to a theme defined in the program solicitation, creating clear matches between funding partners and proposals along thematic lines. At an institute level, each institute is managed by a program officer. Institutes are required to submit annual reports and final project reports to the program officer, under the guidance of the program officer and the NSF Proposal and Award Policies and Procedures Guide (NSF, 2023b).

## NSF Cyberinfrastructure Centers of Excellence

NSF runs a program of CI CoEs. Since the program was established in 2021, two universities have been awarded, as of July 2023 (NSF, undated-a). CI CoEs are awarded for a five-year period of performance and can be renewed if the awardee remains in good standing. An awardee is determined to be in good standing based on a review of performance, NSF prioritization, and continuing demonstrated need (NSF, 2019a). However, it is unclear if there is a renewal limit for CI CoEs. In addition, before committing to a five-year COE, the NSF may choose to instead invest in a two-year pilot CI CoE to demonstrate the feasibility of an eventual full-scale COE (NSF, 2021b).

CI CoEs are funded by standard grants from the NSF Office of Advanced Cyberinfrastructure (OAC) (NSF, 2022; NSF, 2023a). CI CoEs are also encouraged to pursue other OAC funding opportunities, such as the OAC Core Research and Cyberinfrastructure for Sustained Scientific Innovation (NSF, 2021b). Each CI CoE is managed by an assigned program director.

## NSF Cybersecurity Center of Excellence

The NSF runs a Cybersecurity Center of Excellence (CCoE) called Trusted CI, composed of a team of cybersecurity experts from six universities (Trusted CI, undated). Trusted CI started in 2012 to conduct security audits and design reviews and provide education and training to organizations and facilities in the NSF community, such as to Major Facilities, (Adams et al., 2019; Trusted CI, undated). Trusted CI is currently awarded for a five-year period of performance, with the opportunity for a non-competitive renewal for another five years if the institute remains in good standing. The institute is determined to be in good standing based on the outcome of an in-depth 48-month review. While Trusted CI will be re-competed at some point, it was unclear when that competition would take place.

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<sup>17</sup> Funding partners include USDA, NIFA, U.S. Department of Education, Institute of Education Sciences, DHS, S&T, NIST, DoD, Under Secretary of Defense for Research and Engineering (USD(R&E)), and IBM Corporation.

Although Trusted CI was initially funded by two three-year grants, it is currently funded by a five-year cooperative agreement (Adams et al., 2019).<sup>18</sup> Trusted CI is managed by an NSF program officer, who meets monthly with the CCoE. At the start of a project, project plans and metrics are proposed by Trusted CI and are reviewed by the program officer, with some flexibility for revisions. The program officer also conducts reviews of the CCoE, via a 30-month review and a larger 48-month review. However, the program officer is minimally involved as a conduit between the CCoE and NSF facilities, and Trusted CI is responsible for initiating those engagements.

## U.S. Army University Affiliated Research Centers

The U.S. Army runs a program of UARCs. As of July 2023, four Army UARCs have been established, in 1934, 1999, 2002, and 2003, and all four UARCs are still active. USD(R&E) is responsible for competing new UARCs, as well as redesignating existing UARCs every five years, following a UARC Comprehensive Review at the Office of the Undersecretary of Defense level and then at the Pentagon level (Lemnios, 2010). Army UARC projects also run on a schedule of five-year cycles when new projects are introduced and some projects are sunsetted. UARCs were designed to be long-term partnerships to leverage the benefits of the long-term strategic relationship, including “responsiveness to evolving sponsor requirements, comprehensive knowledge of sponsors requirements and problems, broad access to information and proprietary data, broad corporate knowledge, independence and objectivity, quick response capabilities, current operation experience, and freedom from conflicts of interest” (DoD, 2013).

Army UARCs are funded by sole-source noncompetitive contract funding, which can vary year to year based on the Congressional budget. They can also receive funding from other DoD sources, or other external sources (Lemnios, 2010). UARCs do not compete with industry for contracts and generally also do not use subcontracts (Waugh, 2020). Army UARCs are managed by a program manager at the Army Research Office, who works with UARCs on ensuring research performance, Army relevance, and technology transfer.

## U.S. Navy University Affiliated Research Centers

The U.S. Navy runs a program of UARCs that operate very similarly to the U.S. Army UARCs. As of July 2023, five Navy UARCs have been established, four during World War II and one in 2008, and all five are still active. Like Army UARCs, new Navy UARCs are established by competition and existing UARCs are redesignated every five years.

Navy UARCs are also funded by sole-source noncompetitive contract funding and external funding from other DoD or external sources (Lemnios, 2010). Navy UARCs are managed by a UARC Primary Sponsor, and is responsible for working with UARCs to ensure research performance and Navy relevance.

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<sup>18</sup> Trusted CI was funded by three-year grants from 2013–2015 and 2016–2018 (see NSF, 2016; NSF, 2021a). In 2019, it switched to a five-year cooperative agreement.





# Abbreviations

ADAC	Arctic Domain Awareness Center
AI	artificial intelligence
ALERT	Awareness and Localization of Explosives-Related Threats
BES	Office of Basic Energy Sciences
BOA	basic ordering agreements
BOLD	Building Our Largest Dementia
BTI	Borders, Trade, and Immigration Institute
CAOE	Center for Accelerating Operational Efficiency
CAPO	Compliance Assurance Program Office
CBP	U.S. Customs and Border Protection
CBTS	Cross-Border Threat Screening and Supply Chain Defense
CCICADA	Command, Control, and Interoperability Center for Advanced Data Analysis
CCoE	Cybersecurity Center of Excellence
CDC	Centers for Disease Control and Prevention
CEER	Center of Excellence in ELSI Research
CEEZAD	Center for Excellence for Emerging and Zoonotic Animal Diseases
CHC	Coastal Hazards Center
CHiMaD	Center for Hierarchical Materials Design
CI	Cooperative Institutes
CI CoEs	Cyberinfrastructure Centers of Excellence
CINA	Criminal Investigations and Network Analysis Center
CIRI	Critical Infrastructure Resilience Institute
CISA	Cybersecurity & Infrastructure Security Agency
COE	Center of Excellence
CRC	Coastal Resilience Center
CREATE	Center for Risk and Economic Analysis of Threats and Emergencies
DHS	U.S. Department of Homeland Security
DMV	Washington, D.C., Maryland, and Virginia
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
EFRC	Energy Frontier Research Center
ELSI	Ethical, Legal, and Social Implications
FAA	Federal Aviation Administration

FFRDC	federally funded research and development center
FPDI	Food Protection and Defense Institute
FTCOE	Forensic Technology Center of Excellence
GAO	U.S. Government Accountability Office
HHS	U.S. Department of Health and Human Services
HRSA	Health Resources and Services Administration
HSOAC	Homeland Security Operational Analysis Center
HSRD	Homeland Security Research Division
ICE	U.S. Immigration and Customs Enforcement
IIAD	Institute for Infectious Animal Diseases
IMPROVE	Implementing a Maternal Health and Pregnancy Outcomes Vision for Everyone
IRB	Institutional Review Board
IRR	interrater reliability
MBA-STT	Masters of Business Administration in Security Technology Transition
MGI	Materials Genome Initiative
MSC	Maritime Security Center
MSI	Minority Serving Institution
NCEI	National Centers for Environmental Information
NCI	National Cancer Institute
NCITE	National Counterterrorism Innovation, Technology, and Education Center
NHGRI	National Human Genome Research Institute
NIFA	National Institute of Food and Agriculture
NIH	National Institutes of Health
NIJ	National Institute of Justice
NIMHD	National Institute on Minority Health and Health Disparities
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NOFO	notice of funding opportunity
NSF	National Science Foundation
NSGO	National Sea Grant Office
OAC	Office of Advanced Cyberinfrastructure
OAR	Office of Oceanic and Atmospheric Research
OUP	Office of University Programs

PHCoE	Psychological Health Center of Excellence
PM	program manager
PRC	Prevention Research Centers
R&D	research and development
RFP	request for proposals
RPPR	research performance progress report
RTI	Research Triangle Institute
S&T	Science and Technology Directorate
SAMHSA	Substance Abuse and Mental Health Services Administration
SENTRY	Soft-Target Engineering to Neutralize the Threat Reality
SIP	Special Interest Projects
SMMW-CoE	Center of Excellence on Social Media and Mental Wellbeing
START	National Consortium for the Study of Terrorism and Responses to Terrorism
TRACE	Telehealth Research Center of Excellence
UARC	University Affiliated Research Center
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USD(R&E)	Under Secretary of Defense for Research and Engineering
USSS	U.S. Secret Service
VACCINE	Visual Analytics for Command, Control, and Interoperability Environments



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The Homeland Security Act of 2002 mandates that the U.S. Department of Homeland Security (DHS) establish university-based consortia to address challenges for homeland security. Since then, over 20 Centers of Excellence (COEs) have been funded to perform research in the field and develop related curricula and training. These COEs are overseen by the Science and Technology Directorate's (S&T) Office of University Programs (OUP), which engaged the Homeland Security Operational Analysis Center (HSOAC) at RAND to assist in assessing the COEs' core structures, functions, and processes to determine areas for potential improvements.

An HSOAC team thus conducted a study of the DHS COE program, as well as similar COE programs and entities within other federal organizations. They reviewed both publicly available information and internal materials shared by specific programs to understand the objectives, structures, management, and oversight processes of federal COEs, as well as the historical and legal frameworks underpinning COE programs. They also held open-ended discussions with selected points of contact within OUP, DHS components and DHS, and other federal COEs. Through qualitative analysis of the data collected, the HSOAC team identified lessons learned and best practices and made recommendations for federal departments and agencies that support COE programs, including DHS.

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