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ACQUISITION RESEARCH PROGRAM
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Analysis of Department of Defense Commercial Solutions Openings

June 2023

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Prepared for the Naval Postgraduate School, Monterey, CA 93943.

ACQUISITION RESEARCH PROGRAM
DEPARTMENT OF DEFENSE MANAGEMENT
NAVAL POSTGRADUATE SCHOOL

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ABSTRACT

This research provides an analysis of Department of Defense (DOD) use of the Commercial Solutions Opening (CSO), a new general solicitation technique to acquire innovative solutions. The purpose of this research is to identify strengths, weaknesses, and best practices of CSOs and make recommendations based on those observations. It also analyzes the statistical difference in the procurement lead times of contracts awarded from CSOs compared to Federal Acquisition Regulation (FAR)-based solicitations by conducting a statistical analysis of Federal Procurement Data System (FPDS) data. We reviewed data from CSO Cross Talks, congressional briefings and reports, and protest filings to identify 27 strengths, seven weaknesses, and 43 best practices for CSOs. These findings were then categorized by topic areas for systematic analysis. We developed eight recommendations focused on training and development, policy changes, and tracking and reporting, each with their anticipated benefits and methods to implement. As a solicitation technique, the CSO is a valuable tool to achieve innovation, but prudent planning and application of this research's identified best practices are critical to ensure acquisition success. By implementing the recommendations provided in this research, the DOD will be postured to utilize the CSO solicitation technique to its fullest potential, closing the technological capability gap and providing for better defense capabilities to the nation.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACC-NJ	Army Contracting Command – New Jersey
ANSI	American National Standards Institute
AOI	area of interest
ARPA-E	Advanced Research Projects Agency – Energy
BAA	Broad Agency Announcement
BBP	Better Buying Power
CAS	cost accounting standards
CBAR	Contract Business Analysis Repository
CI	confidence interval
CLIN	contract line item number
CMS	Contract Management Standard
COFC	United States Court of Federal Claims
CSO	Commercial Solutions Opening
DAU	Defense Acquisition University
DF	degrees of freedom
DFARS	Defense Federal Acquisition Regulation Supplement
DHS	Department of Homeland Security
DIB	Defense Industrial Base
DIUx	Defense Innovation Unit Experimental
DNDO	Domestic Nuclear Detection Office
DOD	Department of Defense
DoDIG	Department of Defense Inspector General
DOE	Department of Energy
DOT	Department of Transportation
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulation
FARA	Federal Acquisition Reform Act

FASA	Federal Acquisition Streamlining Act
FPDS	Federal Procurement Data Systems
FY	fiscal year
GAAP	generally accepted accounting principles
GAO	Government Accountability Office
GPE	government point of entry
GSA	General Services Administration
HHS	Department of Health and Human Services
IG	Inspector General
IGCE	Independent Government Cost Estimate
IT	information technology
KM	knowledge management
MAJCOM	Major Command
MTA	Middle Tier of Acquisition
NASA	National Aeronautics and Space Administration
NCMA	National Contract Management Association
NDAA	National Defense Authorization Act
NIH	National Institutes of Health
NPS	Naval Postgraduate School
OSD	Office of the Secretary of Defense
OSD/AT&L	Office of the Secretary of Defense, Acquisition, Technology, and Logistics
OSTP	White House Office of Science & Technology Policy
OT	other transaction
PCO	Procuring Contracting Officer
PIEE	Procurement Integrated Enterprise Environment
R&D	research and development
SAF/AQC	Secretary of the Air Force Acquisition Office (Contracting)
SAM	System for Award Management

SAT	simplified acquisition threshold
SBIR	Small Business Innovative Research
SME	subject matter expert
TINA	Truth in Negotiations Act
TSA	Transportation Security Administration
TTP	Tactics, Techniques, and Procedures
U.S.	United States
USAF	United States Air Force
USD(A&S)	Under Secretary of Defense for Acquisition and Sustainment

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I. INTRODUCTION

A. BACKGROUND

It is no secret that the Department of Defense (DOD) traditional acquisition process is slow. For the purposes of this research, "traditional" is defined as Federal Acquisition Regulation (FAR)-based solicitation and award techniques. Since the 1990s, the acquisition process has appeared in some form on the list of top DOD challenges reported by the DOD Inspector General (IG) and has been called "inflexible" (Section 809 Panel, 2018, p. 6) "inefficient" (Department of Defense Inspector General [DoDIG], 2015, p. 10), and "slow" (DoDIG, 2022, p. 7). In 2019, the United States Government Accountability Office (GAO) issued the report "GAO-19-439 DOD Acquisition Reform: Leadership Attention Needed to Effectively Implement Changes to Acquisition Oversight," which discusses congressional concerns over DOD's weapons acquisition process, citing the processes' bureaucracy and delays in fielding innovations (United States Government Accountability Office [GAO]. 2019a). This same report discusses the DOD's intent to increase the speed of the acquisition process through pursuing legislative reforms and acknowledges that DOD has begun to execute those reforms, including realigning certain decision and oversight from the Office of the Secretary of Defense (OSD) to the subordinate military departments, as well as using more streamlined processes.

Regardless of these changes, DOD still struggles to achieve rapid acquisition objectives, narrowing the strategic and defense capabilities gap between the United States (U.S.) and near-peer adversaries. Recent notable examples of this acquisition reform include the Middle Tier of Acquisition (MTA) Pathway for Rapid Prototyping and Rapid Fielding authorized by Section 804 of the fiscal year (FY) 2016 National Defense Authorization Act (NDAA) (2015), Awareness of Other Transaction (OT) Authority, and the adoption of industry standards in acquisition. Even with these reforms, the DOD acquisition process remains slow, expensive, and bureaucratic. In 2021, and in furtherance of rapid acquisition objectives, the U.S. Congress codified Public Law 117-81, the NDAA for FY 2022. Section 803 of the act provides permanent authority for a new type of rapid acquisition, the Commercial Solutions Opening (CSO). The CSO is a solicitation technique

that is designed as an innovative means to solve the problem of slow government procurement. At its core, the CSO seeks to take a broadly identified objective, stated in a manner that allows for diverse solutions, and award a contract to meet those objectives within a matter of weeks, as opposed to the methods that now takes months or even years using traditional models. A CSO can result in both FAR-based and non-FAR-based contracts and is used to acquire an innovative technology or an innovative means or method to accomplish the objective.

While innovation is specifically defined in the FY 2022 NDAA (2021) as "(1) any technology, process, or method, including research and development, that is new as of the date of submission of a proposal;" or "(2) any application that is new as of the date of submission of a proposal of a technology, process, or method existing as of such date," (p. 275), innovation does not require the solution be completely new or never-before attempted. In fact, the CSO community even refers to simple maintenance activities like grounds maintenance as candidates for CSOs, if the agency seeks an innovative means or method of achieving these common tasks (82d Contracting Squadron, 2020).

For the flexibility and many efficiencies a CSO provides, it is important to also recognize how not to use a CSO. Based on the authors' collective research from various sources and experiences, a CSO is not: a solicitation technique to obtain services where the government already has the requirement defined, a solicitation technique to obtain standard technological configurations or support where the government has a design specification, a solicitation technique to shortcut competition or except fair opportunity, or a quick sourcing solution for poorly-defined requirements (Secretary of the Air Force Acquisition Office (Contracting Policy / Regulation) [SAF/AQCP], 2022). The next section describes the purpose of this research.

B. PURPOSE

The DOD's issuance of the class deviation to permanently authorize CSOs is evidence of its commitment to use innovative solicitation practices to find and secure innovative solutions for the warfighter. It is important that the DOD acquisition community takes advantage of the opportunity by utilizing CSOs to the maximum extent practicable

to remain competitive for the best ideas and solutions available from private industry. Since companies are not compelled to sell their products and services to the government, it is important for the DOD to make their acquisition process as efficient and mutually beneficial as possible for both the buyers and sellers. Otherwise, the government may lose companies' innovative solutions to private industry exclusivity, or worse, its foreign adversaries. As Bresler and Bresler (2020) stated in their article, "Defense Efforts to Attract Innovators are Falling Short":

> Because commercial companies with no ties to the federal market increasingly drive advancements in areas crucial to national defense, creating opportunities for these companies to build meaningful revenue streams in the public sector is also essential in curbing the flow of critical technologies overseas—particularly to China. (p. 52)

The primary purpose of this research is to identify the strengths, weaknesses, and best practices of the CSO as a solicitation technique leading to a contract award. This research intends to provide DOD organizations and their workforces with a consolidated report analyzing available data on the CSO solicitation technique and making recommendations based on the use of CSOs. Following the purpose of the research, the next section will specify the research questions with which we hope to achieve the purpose.

C. RESEARCH QUESTIONS

This research is framed by the understanding that traditional FAR techniques can be ineffective at acquiring innovative solutions (GAO, 2019a). This research explores the flexibility and opportunities of CSOs as a solicitation technique to acquire innovative solutions and seeks to answer the following questions:

1. What are CSOs' strengths as a solicitation technique?
2. What are CSOs' weaknesses as a solicitation technique?
3. What are best practices for utilizing the CSO solicitation process?
4. What is the statistical difference, if any, in the procurement lead times of contracts awarded from a CSO and those awarded from a FAR-based solicitation, and what inferences can be made of this difference?

The next section describes the organization of this report to understand how the research questions will be answered.

D. ORGANIZATION OF REPORT

This report is organized into five chapters. Chapter I establishes background information, purpose, primary research questions, and a brief discussion of the methodology used to answer those questions. The benefits and limitations of conducting this research will also be discussed.

Chapter II consists of a literature review beginning with the research's theoretical frameworks, particularly innovation theory. The CSO's legislative history, policy, and procedures will then be discussed along with other acquisition reform efforts. A context summary of the Contract Management Standards (CMS) will then be shared. Various applications of the CMS within the DOD to include Requirements Planning, Acquisition of Commercial Products and Services, Contract Pricing, and the Broad Agency Announcement (BAA) will be explored as they relate to CSOs. Finally, the Defense Innovation Unit Experimental (DIUx) Commercial Solutions Opening and other research conducted on CSOs and innovative solicitation techniques will be covered.

Chapter III presents the research methodology for how direct feedback will be assessed from CSO Cross Talk meetings and other published briefings and reports. It also shares how Federal Procurement Data Systems (FPDS) data will be retrieved and analyzed. Chapter IV then shares the findings and discussion resulting from that data and feedback before making recommendations in the areas of training and development, policy changes, and tracking and capturing metrics.

Finally, Chapter V provides a summary of the research, a conclusion of the findings, and areas for further research. The next section describes the methodology we will use to complete the research.

E. METHODOLOGY

This research assesses the strengths, weaknesses, and best practices of CSOs as a solicitation technique in acquiring innovative solutions. Extensive direct feedback will be

captured from CSO Cross Talk meetings among DOD agency points of contact who have previously conducted CSOs and/or are working to develop CSO policies/procedures at their individual agencies. These feedback meetings are led by the Secretary of the Air Force Acquisition Office (Contracting) (SAF/AQC). This information will be reviewed for strengths and/or weaknesses regarding training and information sharing, internal agency processes, solicitation definition, and industry interaction. Assessment of different individuals' varied interpretation and implementation of the flexible process to meet their specific program and agency goals will inform the categorization of strengths, weaknesses, and best practices. Similar direct user feedback will be discussed as compiled for and documented in other published briefings and reports. The research will also attempt to quantify DOD's procurement lead time through the use of data from the FPDS and determine if there is a statistical difference in the procurement lead time of contracts awarded from a CSO and those using a FAR-based solicitation. The final results will be presented in the form of recommendations that DOD and its contracting offices can use to best implement CSOs. Following the research methodology, the next section provides the intended and anticipated benefits of this research.

F. BENEFITS OF THE RESEARCH

This research will capture a collective of strengths, weaknesses, and best practices of CSOs as a solicitation technique within the acquisition community. As a result of this research, the DOD will be able to aggregate lessons learned and bolster the DOD's Knowledge Management (KM) environment (Neary, 2018), leading to further proliferation of the strengths, weaknesses, and best practices of using CSOs to acquire innovative solutions. Other agencies outside of the DOD will also be able to use this research to evidence the utility of CSOs in requesting their own permanent authority. Furthermore, this research provides an analysis to shape informed decision making for future solicitation strategies as future requirements owners and contracting offices develop their plans to meet agency needs. Finally, the research can be used as a catalyst to refine CSO reporting requirements, bolstering the data value stream for the department's executive decision makers. The next section describes the limitations of this research.

G. LIMITATIONS OF THE RESEARCH

For its many intended benefits, this research is not without limitations. The primary limitation is that CSO data is limited in quality and quantity. Quality is limited by the accuracy of information input by the acquisition community in response to agency questionnaires, CSO Cross talk presentations, and contract action reports submitted to the FPDS. Quality can be improved with continued training, development, and KM investments. Data quantity is also a limitation in that the process for executing CSOs is immature and varies between agencies. Unlike many established solicitation types, CSOs are derived from a relatively new authority; therefore, reviews and reports from government oversight agencies such as the GAO are sparse. The research will also be constrained to data from the pre-award phase and leading to award as defined by the CMS discussed in Chapter II of this report. Finally, this research only considers data and literature available as of January 31, 2023, but information about CSOs is rapidly evolving beyond that date. The next section summarizes the entire contents of this chapter and provides a preview of Chapter II.

H. SUMMARY

This chapter discussed concerns about DOD's traditional acquisition process and introduced its recent reforms to improve upon it. One of these reforms to be analyzed in depth throughout this research is the CSO, a solicitation technique to award innovative solutions for the DOD. The primary purpose of this research is to explore CSO strengths and weaknesses and provide the DOD consolidated analyses of best practices on their use. This chapter provided the report's chapter organization and a brief overview of the methodology to collect and assess CSO usage feedback and other data. Finally, benefits and limitations of the research were shared to provide context for the DOD and other agencies. The next chapter is a literature review that considers theoretical frameworks, an in-depth look at the CSO's history and procedures, and other acquisition reform efforts. It then dissects the CMS and DOD's application of those standards through FAR methodology. Finally, it explores DIUx CSOs, and other research done on CSOs and innovative acquisition techniques.

II. LITERATURE REVIEW

A. INTRODUCTION

The purpose of this chapter is to provide an overview of theory, CMS context, FAR acquisition process requirements, and the evolution of acquisition flexibility preferences leading to the eventual development of CSOs. This literature review begins with a discussion of the Innovation Theory, which is an applicable framework through which to assess the CSO. It then provides a discussion of CSO legislative history, policy, and procedures. It discusses other acquisition reform efforts and provides a summary of the CMS to give the reader an understanding of its processes. Next, this chapter informs the reader of the background of FAR-based solicitation techniques to award government contracts and where opportunities and needs were identified to create the CSO authority to acquire innovative commercial products, technologies, or services (Tenaglia, 2022). A discussion of requirements planning is conducted regarding early requirement development before acquisition of commercial products and services, contract pricing, and the BAA processes are discussed. DIUx's version of the CSO, the most immediate precursor to the CSO as defined in this research, is then examined before other research conducted regarding CSOs and innovative solicitation techniques are discussed. The next section begins the literature review with an explanation of innovation theory, the root of CSOs as an innovative solicitation procedure.

B. INNOVATION THEORY

Chapter I established that CSOs present an opportunity for the DOD to make critical investments in technology and capability by leveraging the technological capabilities of the department's industrial base. In fact, the adoption of CSOs as a permanent authority is itself, innovative. To understand how these innovative capabilities can shape the DOD, it is important to understand the theory supporting innovation in business, including the different paradigms that are found in literature. First, we must consider the DOD as a type of KM firm with "roles and processes to support decision-making" (Neary, 2018. p. 1). The DOD as a KM firm is comprised of individuals with tacit, explicit, and implicit

knowledge of the military's operations, from munitions flight trajectories to the ideal length of a blade of grass along a flightline. Within this construct, the DOD is operating as a firm competing with other nations; this defines the marketplace within which innovation leads to competitive advantage and provides a framework against which innovation theory can be applied. The first part of this section discusses innovation theory in the context of KM.

1. Innovation Theory and Knowledge Management

Considering the DOD as a type of KM firm, we can apply Johannessen, Olsen, and Olaisen's (1999) assertion that the "unending stream of knowledge keeping markets in perpetual motion, calls for companies to execute continuous improvements and continuous innovation, while simultaneously limiting imitation" (p. 122). Furthermore, Johannessen et al. assert that "certain firms have more information than others, and turning this into knowledge gives them an advantage in ascertaining market inefficiencies, putting them in a better position to innovate" (p. 123). To truly capitalize on the benefits of CSOs, the DOD must consider itself to operate in a KM environment. KM is a key enabler in identifying problems and solutions and paving the way for innovation to occur. Conceptualizing and managing change through exploiting the learning capacity of knowledge-workers is considered a competitive advantage according to Nonaka (2007). Individuals hold the ideas and knowledge necessary for the creation of new products and services as well as the ability to add value to old ideas and concepts (Seagal & Horne, 1997). Innovation theory states that a manager's role in the knowledge-based industry is to "manage the environment or context in which work is done" (Johannessen et al., 1999, p. 132). For the DOD, this management comes from the program manager with assistance from the acquisition team, who leverages their expertise to achieve results over productivity, fostering innovation and bolstering military capability while leading the team of government and contractor innovators. The winning program manager provides "their people with the best weapons with which to compete, i.e., knowledge and service" (Johannessen et al., 1999, p. 132). This process is summarized in Figure 1.

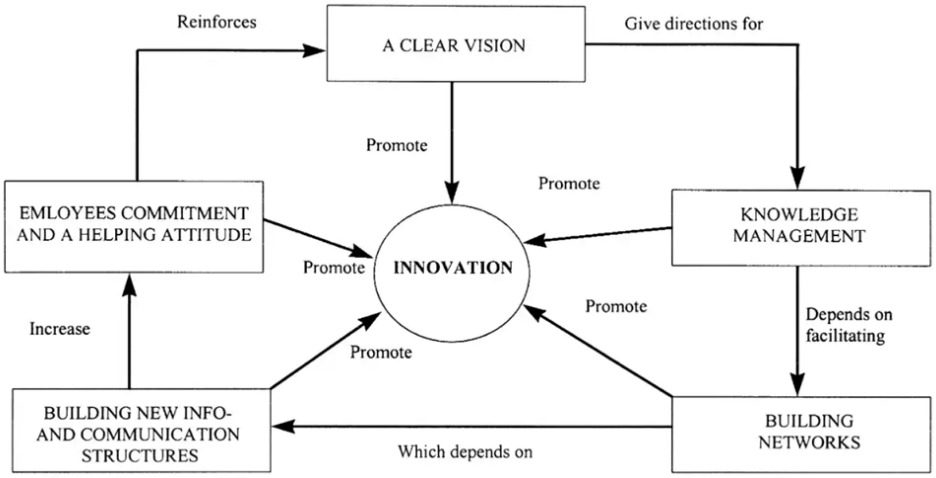

Figure 1. The Management of Knowledge.
Source: Johannessen et al. (1999, p. 133).

The findings of this research will enable knowledge managers in the DOD to integrate the results into their own KM stream, fully capitalizing on the ability to achieve innovative solutions through the CSO process. The next part of this section discusses broader innovation theory paradigms to establish a more diverse basis of understanding.

2. Innovation Theory Paradigms

In its traditional sense, innovation theory has been formed at the macro-economic level as an attempt to explain innovative processes and economic growth, but as the theory has evolved, so have innovation theories to explain innovation activities in enterprises. Sundbo (1995) has postulated that innovation is the "activity of developing an already invented element into a commercially useful element, which becomes accepted in a social system (a firm, a society and so on)" (p. 400).

In the first theories of comprehensive innovation developed by Tarde (1903), innovation came from the inventions of individuals. According to Sundbo (1995), Schumpeter took this concept further by applying innovation as an enterprise phenomenon and the entrepreneur, enterprises led by people of practical action. To the entrepreneur, innovation is "connected with a certain amount of risk which cannot be avoided"; this innovation results in "a disturbance in the economic system" (Sundbo, p. 401). For the

DOD, this economic system can be considered the defense space and military capability. Through this paradigm, innovation is key to disrupting the military landscape and achieving military prowess.

In the contemporary version of innovation, the role of the entrepreneur has evolved to include an individual or entity who "can see unexploited possibilities in the existing market and who can co-ordinate the enterprise's internal resources to exploit these possibilities" (Sundbo, 1995, p. 401). Sundbo also states that innovation "does not need to take place in an [research and development] department," (1995, p. 402) but can rather be the result of changes in business processes, procedures, and approaches. Lastly, Sundbo describes the strategic innovation paradigm in which he describes innovation as "to see new possibilities on the market and exploit these possibilities by marketing new products, or old products in a new way, or in new combinations" (p. 403). This paradigm of innovation theory is critical in understanding the flexibility and limitless possibilities of CSOs as a solicitation technique to acquire innovation, as the focus need not be on a single materiel solution. By applying innovation theory, the DOD is empowered to leverage CSOs to acquire new methods of targeting capabilities for munitions, new methods of groundskeeping, and everything in between. The next section will discuss how the DOD is implementing innovation theory through its development and application of the CSO as a solicitation technique to acquire innovation.

C. COMMERCIAL SOLUTIONS OPENING LEGISLATIVE HISTORY, POLICY, AND PROCEDURES

With a basis of innovation theory and before delving into the FAR processes and other acquisition flexibilities that broadly led to the creation of the CSO, it is important to define its immediate history, policy, and procedures. On June 26, 2018, Class Deviation 2018-O0016 "Defense Commercial Solutions Opening Pilot Program" was published allowing contracting officers to "acquire innovative commercial items, technologies, or services using a competitive procedure called a CSO" under the authority of Section 879 of the NDAA for FY 2017 (Assad, 2018). This authority was set to expire on September 30, 2022; however, less than four years later, on February 4, 2022, Class Deviation 2022-O0007 "Defense Commercial Solutions Opening" rescinded and superseded the previous

class deviation to give the CSO permanent authority by Section 803 of the NDAA FY 2022 (Tenaglia, 2022). There are minimal required procedures when a contracting officer chooses to utilize a CSO under this class deviation, which can be found in its entirety at Appendix A. However, key operational aspects germane to this research are provided in Figure 2.

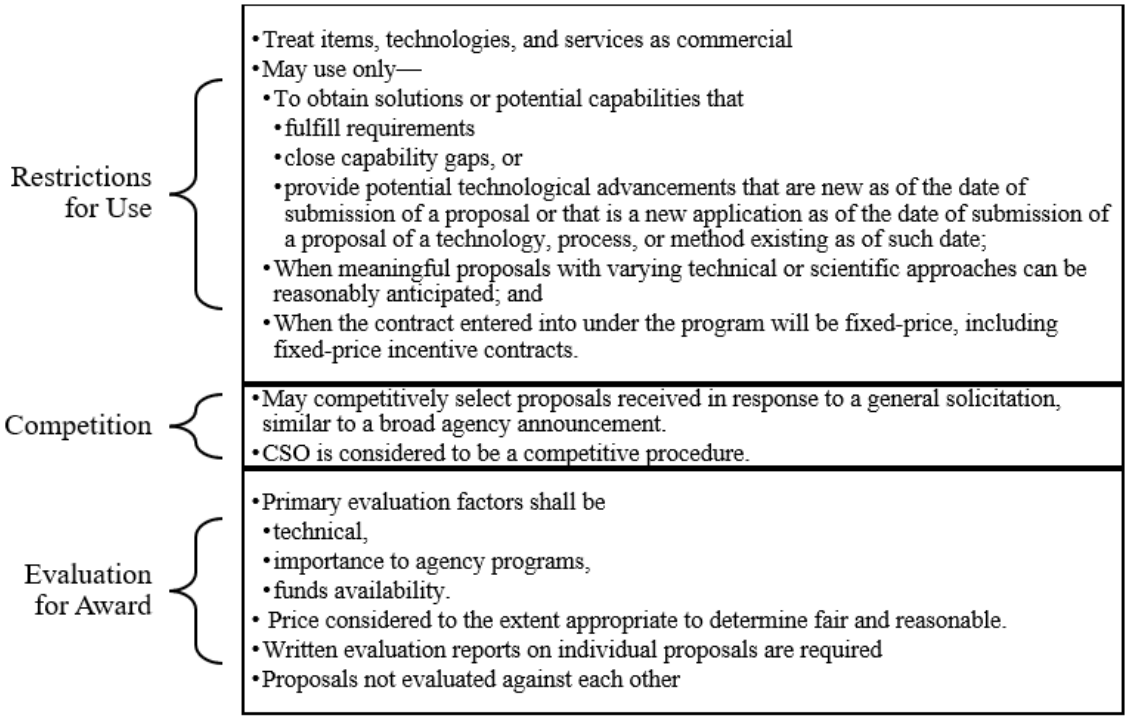

Figure 2. CSO Deviation Key Aspects.
Adapted from Tenaglia (2022).

Beyond the relatively minimal guidance/instruction, the mechanics of utilizing a CSO are left up to the interpretation of the various DOD organizations and individual contracting officers. As such, organizations have varied in their implementation of guidance and additional policies for CSOs.

The United States Air Force (USAF) (2022) has created robust guidance for its acquisition workforce with its "Tactics, Techniques, and Procedures (TTP) for the DOD CSO Program." The TTP educates and encourages the reader to utilize this authority by outlining the "Top Ten Reasons to Use a CSO" to include "DOD Source Selection

Procedures do not apply," and "[e]valuations are streamlined because the evaluation factors are already provided for by the Class Deviation and are conducted via a technical evaluation ("peer review")" (United States Air Force [USAF] p. 2). It also highlighted that "[a]ll supplies or services procured via a CSO are *treated* [emphasis added] as commercial items *absent* [emphasis added] the requirement for a commercial item determination" (USAF, 2022, p. 2). Finally, it notably declared that CSOs "[s]ignificantly decreased acquisition cycle time" (USAF, 2022, p. 2).

These specific items from the list emphasize the USAF's belief that CSOs will be a major process improvement. The TTP further provides various tangible, sometimes humorous, examples of whether a CSO is appropriate (e.g., toilet paper = no vs. time machine = yes) (USAF, 2022). The TTP also shares its own definitions for a list of commonly used, but not all-inclusive, CSO solicitation variations. These are not defined by DOD regulation, but they are USAF's way to provide options for how a contracting officer could go about drafting a CSO. Some examples are the Open CSO (white paper or proposal submission at any time within a specified period), Closed CSO (submissions due by specific date and time), One-Step Closed CSO (no white paper submitted prior to full proposal), and CSO with Calls (Open CSO with further technical details specifications requested at various points) (USAF, 2022). While this may help contracting officers with a head start in ideas for how to structure their CSO, it may also limit the creativity allowed under the original policy. However, to ensure various CSOs do not risk non-compliance with standard requirements across the USAF, the TTP answers some questions for when and how to document the acquisition strategy, small business coordination documentation, and business clearance among other detailed requirements for other more standard acquisitions (USAF, 2022). Finally, the USAF includes various sample documentation to assist its acquisition workforce with streamlining their solicitation development and uniformity.

In addition to the USAF's (2022) TTP, the Department of Homeland Security (DHS) published their own "Commercial Solutions Opening Pilot Program Guide" on June 15, 2018. However, this is derived under a different authority: Section 880 of the NDAA for FY 2017 (Pub. L. 114–328), Pilot Programs for Authority to Acquire Innovative

Commercial Items Using General Solicitation Competitive Procedures (DHS). Similarly, the GSA's Procurement Innovation Resource Center issued its "CSO Guide" on June 1, 2018. While neither of these will be discussed further in this paper because they are based on a different authority and do not apply to the Department of Defense, it is notable that they were both drafted within six months of when pilot authority was given with encouragement to use the authority and comply with post-award reporting procedures to capture CSO effectiveness and successes to inform any future adoption of permanent authority (Procurement Innovation Resource Center, 2018). The next section discusses other acquisition reform efforts that the DOD has utilized to improve upon traditional acquisition processes.

D. OTHER ACQUISITION REFORM EFFORTS

In recent history, the DOD has made multiple attempts at acquisition reform in an effort to streamline the acquisition process and achieve rapid innovation through the acquisition process. As discussed in Chapter I, some of these efforts include MTA Pathway for Rapid Prototyping and Rapid Fielding, Awareness of OT Authority, and the adoption of industry standards in acquisition. This section provides an overview of these reform efforts and establishes the legislative framework that preceded the DOD's CSO authority.

1. Middle Tier of Acquisition Pathway for Rapid Prototyping and Rapid Fielding

This acquisition reform effort was authorized in 2015 by Section 804 of the FY2016 NDAA. According to the DoDIG (2022):

> MTA is a rapid acquisition approach that focuses on delivering capability in 2 to 5 years. The DOD is increasing its use of the MTA pathway with 131 programs as of October 2022. However, the DOD struggles to rapidly field capabilities within budget that meet user needs because the DOD lacks sufficient program data related to cost, schedule, and performance that would enable adequate management oversight. (p. 18)

The MTA is an authority which primarily focuses on rapidly developing fieldable prototypes and production quantities of systems that require minimal development. MTA is a streamlined authority that shortens the acquisition time over traditional models, but as

the GAO (2022a) found, MTA programs lacked consistent cost information and plans for sufficient technical information to be obtained in support of follow-on efforts including "further development, testing, or production" (DoDIG, 2022, p. 18). In addition, some programs had "missed key events [and milestones] that could challenge [or delay the] planned fielding schedules" (DoDIG, 2022, p. 18).

2. Awareness of Other Transaction Authority

In 2014, the White House Office of Science & Technology Policy (OSTP) published "Innovative Contracting Case Studies." This study found that OTs "allow agencies and their contracting partners to enter into flexible arrangements tailored to the particular project and needs of the participants. OTs present the parties with a blank page from which to begin negotiations" (p. 15). OTs are non-FAR approaches to acquire solutions from industry, and are defined by the Defense Acquisition University (DAU) (n.d.) as:

> contractual instruments other than standard procurement contracts, grants, or cooperative agreements which can include flexible business arrangements to acquire research and development activities to advance new technologies, and prototypes or models to evaluate technical or manufacturing feasibility or military utility of new or existing technology.

Following the OSTP study and in 2015, Congress granted DOD permanent authority to use OTs to "acquire prototype projects that, among other things, demonstrate whether technologies and products can be adapted for DOD's use" (GAO, 2019b, highlights). Since this authority, the DOD major services began exploring expanded use possibilities to meet mission needs, increasing awareness by bringing OTs into the acquisition planning and strategy discussions as well as the workforce education space. One might consider this a "movement" of sorts with Major Command (MAJCOM)s even establishing their own centers of expertise. For example, according to GAO-20-84, from 2016–2018 "the Army was responsible for over two-thirds of new awards and actions" (GAO, 2019b, p. 10) for all of DOD. In the report GAO relied heavily on input from the Army Contracting Command—New Jersey (ACC-NJ) as one of the lead offices within the DOD executing OTs. Tobin, Millner, and Gillete (2016) also demonstrate ACC-NJ as the

leader in OTs for the DOD in both dollars obligated and actions executed from 2012 to 2016. By querying the GSA, Tobin et al. found that ACC-NJ had executed 594 OT actions and obligated $1.9B in funds through August 2016; this represents 61% of total OT actions and 72% of OT obligations, significantly more than any other DOD office. In GAO-20-84, GAO found a 149% increase in OT actions and a 164% increase in OT obligations from FYs 2016 to 2018, increasing from 248 actions and $1.4B in FY 2016 to 618 actions and $3.7B in FY 2018. This movement culminated in the codification of Section 867 of the FY 2018 NDAA (2017), which required the Secretary of Defense to establish a preference for using OTs in place of contracts, cooperative agreements, and grants in the execution of science and technology and prototyping programs.

3. Adoption of Industry Standards in Acquisition

In another effort to reform acquisition, the DOD adopted the National Contract Management Association (NCMA)'s CMS as its competency model in 2020, satisfying Section 861 of the FY 2020 NDAA requirement to use standards developed by a third-party accredited program (NDAA, 2019). This adoption of the CMS enables the DOD to adopt a standard for contract management processes through job tasks and competencies (Department of Defense [DOD], 2020). The DOD (2020) elaborates that technical and professional competencies need to be defined from both the buyer and seller perspectives, and that "success of one party cannot occur without the success of the other party" (p. 2). The NCMA's CMS will be discussed in the next section.

E. CONTRACT MANAGEMENT STANDARD

In order to frame how the CSO solicitation technique augments the FAR-based contracting process, one must understand the NCMA's CMS. The American National Standards Institute (ANSI) accredited NCMA's standard in 2019 to define the rules, guidelines, and characteristics of the contract management profession to "improve productivity, increase efficiency, and reduce costs" (National Contract Management Association [NCMA], 2019, p. 20). It integrates the contracting process design to be intuitive and predictable in an otherwise diverse and dynamic field. If both buyers and sellers are using the same terminology and practices, then "the likelihood of reaching

agreement on matters relating to contract intent and interpretation is increased" (NCMA, 2019, p. 21). Figure 3 presents the overarching framework applicable to contract management, the three contract life cycle phases, and their various domains/competencies. Particularly relevant to this paper regarding CSOs are the first two of the three contract life cycle phases, pre-award and award, which occur before post-award.

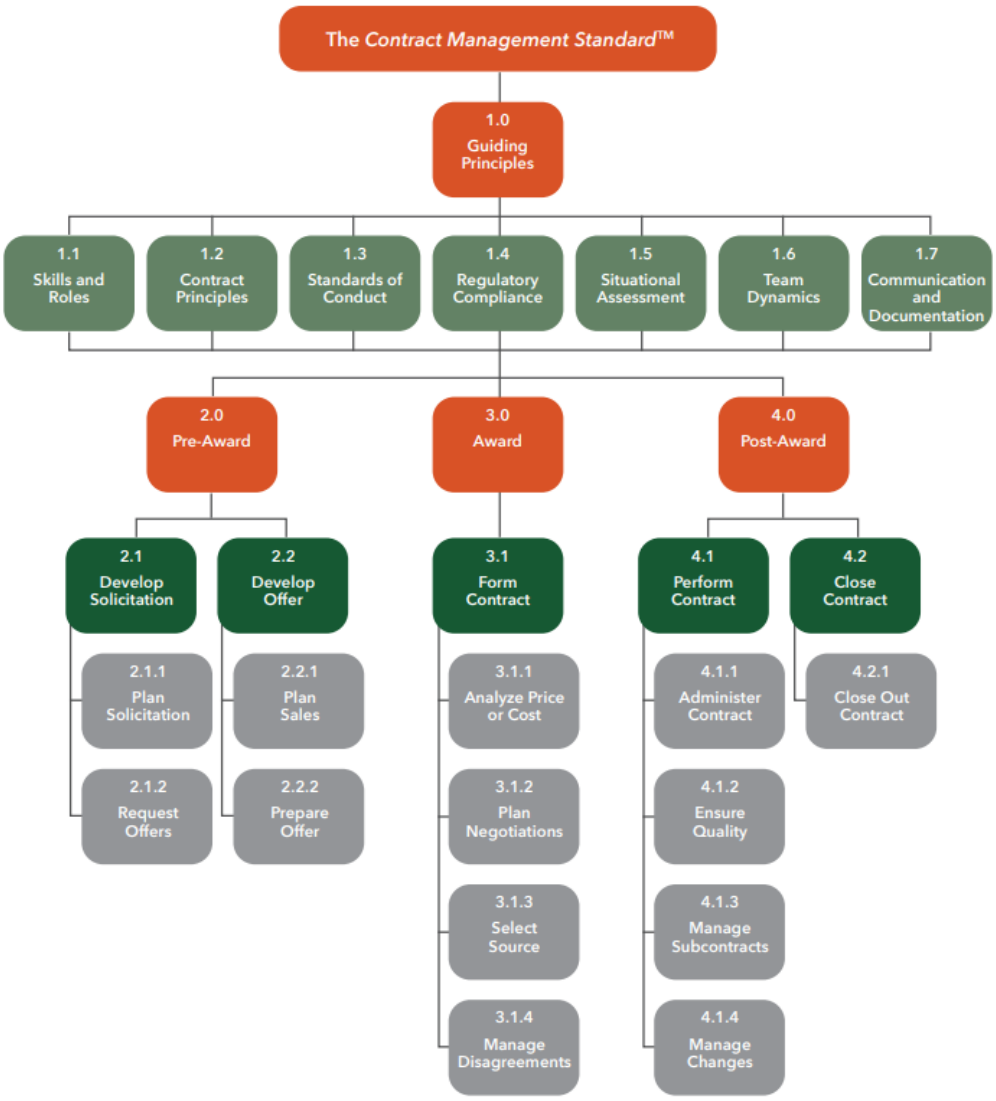

Figure 3. Contract Management Standard.
Adapted from NCMA (2019).

1. Pre-award Phase

The CMS explains that the pre-award phase begins with solicitation planning to include a "description of the need to be satisfied" (NCMA, 2019, p. 127). A looser interpretation of that step is made for CSOs because the requirement is not being defined beyond a request for "innovative commercial products, technologies, or services" (Tenaglia, 2022, p. 1) using a general solicitation. However, this still satisfies the standard's intent by fulfilling the competencies of "plan solicitation" and "request offers" under the "Develop Solicitation" domain (NCMA, 2019, p. 126). On the seller's side, its competencies of "plan sales" and "prepare offer" under the "Develop Offer" domain are also being fulfilled within this structure. The DOD-identified value added is still occurring in that the seller is "providing the buyer . . . a comprehensive solution to the buyer's requirement" (DOD, 2020, p. 12) of innovation that will "enhance marketplace positioning" (NCMA, 2019, p. 165).

2. Award Phase

The Award Phase is also satisfied under the CSO in that its single domain, "Form Contract," is still completed with the buyer's job tasks of "evaluating offers, conducting negotiations (as applicable), selecting the source, awarding the contract(s), debriefing offerors, and addressing mistakes in offers and seller challenges to the selection process" (DOD, 2020, p. 13). Concurrently, the seller's job tasks include "clarifying offers, participating in negotiations, and preparing final offers" (DOD, 2020, p. 13). A wrinkle of this process with the CSO is that evaluation of offers can occur as additional offers are received at any time while the CSO is publicized, which must occur at least annually. Additionally, while written evaluation reports are required, multiple proposals received do not need to be "evaluated against each other [because] they are not submitted in response to a common" requirements document (Tenaglia, 2022, p. 3). Regardless, the value added assured by the CMS is still there in that the process should "mitigate or eliminate contract performance risk by selecting the best source and negotiating fair and reasonable prices and terms and conditions" (NCMA, 2019, p. 180).

3. Post-award Phase

Beyond those first two phases in the contract life cycle, the post-award phase would proceed in essentially the same way as if the contract had been awarded using a FAR-based process in its two domains of "Perform Contract" and "Close Contract" (NCMA, 2019). However, contract administration responsibilities vary based on contract complexity, so aspects of contracts awarded from CSOs (e.g., only fixed-price using commercial terms and conditions) may ultimately affect the post-award phase differently than another solicitation's award for other similar solutions. Regardless, the value added is still the same to ensure compliance with contractual terms and conditions (NCMA, 2019). As the CMS was adopted by the DOD, as well as other federal government civilian agencies, the following section will discuss how the DOD applies the CMS with discussion of the FAR as it relates to using the CSO solicitation technique.

F. DEPARTMENT OF DEFENSE APPLICATION OF THE CONTRACT MANAGEMENT STANDARD

In a report to the House Armed Services Committee, a panel informs that "the plethora of regulations specific to government and defense contracting dissuades many companies from competing for government contracts. The acquisition process is often bureaucratic and rigid, with insufficient flexibility" (Committee on Armed Services, 2012, p. vii). This process is predominantly governed by the FAR, which codifies policies and procedures for all federal agencies, including the DOD. The FAR seeks to provide policies and procedures to "satisfy the customer in terms of cost, quality, and timeliness of the delivered product or service . . . [through] balancing the many competing interest in the System" resulting in "a system which works better and costs less" (Federal Acquisition Regulation [FAR] 1.1). The FAR is separated into 53 distinct parts, with three parts reserved for future use. Each FAR part covers a separate aspect of acquisition and is commonly referenced by acquisition professionals for guidance and to make interpretations. In addition to the FAR, the DOD supplements and implements the FAR through the Defense FAR Supplement (DFARS). Many agencies have also supplemented the FAR and DFARS through their own agency supplements. This section dissects the FAR as it applies to the CSO solicitation process through the CMS pre-award and award phases.

1. Requirements Planning

Requirements planning is covered by FAR parts 7, Acquisition Planning, and 10, Market Research. When sourcing a federal need, planning is pivotal. With the billions of dollars the DOD obligates every year, "acquisition planning" is one of the best-known phrases among the acquisition community. The DOD planned $1.21 trillion in total obligations and almost $400 billion in award obligations in FY 2022 (USASPENDING.GOV, 2022). Acquisition planning takes many forms, but it is most well-known by the authorities of FAR part 7, Acquisition Planning.

With all of its restrictions, federal policy focuses first on promoting and providing for commercial solutions and competition to meet agency needs (FAR 7.1). This presents the perfect primer for considering commercial solutions, including CSOs, first in the planning process. When considering a CSO, Tenaglia (2022) states the Agency must adhere to the following restrictions:

> [CSOs may be used only] to obtain solutions/capabilities that fulfill requirements, close capability gaps, or provide potential technological advancements that are new as of the date of submission of a proposal [including a] new application [of an existing] technology, process, or method. [CSOs may be used only when a meaningful proposal(s)] with varying technical or scientific approaches can be reasonably anticipated. [CSOs may be used only when] the contract . . . under the program will be fixed-price, including fixed-price incentive contracts. [Evaluation factors shall be] technical, importance to agency programs, and funds availability. Price . . . considered . . . at minimum, to determine that the price is fair and reasonable. Written evaluation reports . . . are required, but proposals need not be evaluated against each other. (pp. 2–3)

To the experienced program manager or contracting officer, addressing these restrictions will look quite familiar as critical components of acquisition planning. CSOs, however, signal a departure in the FAR part 7 acquisition planning process as compared to FAR-based acquisitions. That is not to say the acquisition planning does not occur, but with CSOs, planning takes on a completely different persona. Under the FAR-based model, acquisition planning is focused on sourcing requirements-driven solutions. This drives industry to bring a standard solution to meet a government specification and does not allow for varied industry-driven ideas and involvement. In contrast, CSOs allow the government

to define its needs at a higher level through broad areas of interest (AOI)s , reducing the rigidity in the process. These AOIs can either be "for an individual program . . . or for broadly defined [AOIs] covering the full range of . . . requirements" (Tenaglia, 2022, p. 2). This enables technology to lead the solution discussions, unlocking new and emerging technology to the government.

A perceived strength in planning for CSOs lies in its starkest differences with FAR-based acquisitions. Traditionally, the government acquisition team includes a Statement of Work, Performance Work Statement, or at least a Statement of Objectives in its solicitation to provide guardrails for contractors to propose how to fulfill requirements and execute the requirement into a final deliverable(s). By contrast, CSOs allow the government to merely define the problem set or even broad AOI(s), and encourage offerors, who have the true expertise and superior knowledge of their industry and capabilities, to propose a solution. FAR-based acquisitions provide for iterative improvements driven by the government teams through lessons learned and reviews of requirements and strategies (FAR 7.1); while good in theory, this self-contained myopic process narrows the site picture and relies solely on the government to identify and act upon improvement areas. CSO solicitations broaden the scope and allow for offerors to propose widely varying approaches to meet government interest areas, some of which the government may have yet to identify. Finally, FAR-based acquisition planning focuses on the "statement of need" and establishes the government's plan to achieve those objectives (FAR 7.1). While the practice of including a Statement of Objectives in a solicitation allows flexibility for an offeror to propose a creative solution, the functional departure of CSOs is that the initial planning process takes the flexibility even further by focusing solely on defining and refining the statement of need and AOI. Rather than solving the agency's problem internally, CSOs engage industry in developing innovative solutions to satisfy the government need.

As with all proper planning, the acquisition team must consider the necessary elements of risk. The traditional acquisition model seeks to manage and mitigate each discernable element of acquisition cost, technical, and performance risk, including an analysis of the consequences of failure to achieve goals (FAR 7.1). The traditional acquisition model is risk-averse and only seeks to accept risk where absolutely necessary.

CSOs, however, invite risk in a properly controlled environment. With the CSO process, the DOD is signaling that it thirsts for innovation and recognizes that innovation is risky by definition. The DOD is not throwing caution to the wind, however, as CSOs must result in a fixed-price arrangement. The DOD is willing to share the burden of risk with the contractor, accepting greater technical and performance risk while shifting cost risk to the contractor.

CSOs also carve critical time out of the planning process by supplanting traditional market research methods. Market research as an ongoing process is only as useful as the acquisition team's ability to define the requirement. Under traditional market research models, the acquisition team may conduct multiple discreet activities to seek industry input for a single solution, some of which have a significant labor and disruption cost including sources sought notices, requests for information, industry days, site visits, and interviews, just to name a few. These activities are costly, time-consuming, and often duplicative across functional areas with similar requirements. CSOs do not eliminate market research entirely, as a general awareness of industry capabilities is still required, but CSOs do replace traditional market research methods by allowing industry partners to offer solutions to a problem, rather than a desired solution. The posting of the CSO itself mimics a combination of the requests for information and sources sought notice processes, but rather than waiting for the results of these announcements to complete the planning process and sourcing strategy, the CSO allows the acquisition team to progress straight to the submission of proposals to meet the government need. This efficiency is a critical enabler in achieving rapid acquisition targets. The next subsection continues the dissection of the FAR as it discusses the acquisition of commercial products and services.

2. Commercial Products and Services

Commercial Products and Services are discussed in FAR part 12, Acquisition of Commercial Products and Commercial Services. A key milestone on the road to CSOs came with the passing of the Federal Acquisition Streamlining Act (FASA) of 1994. Title VIII of this statute (1994) introduced the term "commercial item" into public law and summarily defined it as "[a]ny item, other than real property, that is of a type customarily

used by the general public or by nongovernmental entities for purposes other than governmental purposes" (p. 143). With this, the statute (1994) prescribed that "contracts for the acquisition of commercial end items . . . shall, to the maximum extent practicable, include only those contract clauses . . . that are determined to be consistent with standard commercial practices" (p. 144–145). Additionally, this public law (1994) instructed that the FAR shall include a requirement that commercial items only be procured using "firm, fixed price or fixed price with economic price adjustment contracts . . . to the maximum extent practicable" (p. 145) with an explicit "prohibition on . . . cost type contracts" (p. 145). Within these restrictions, a preference for acquisition of commercial items was established (FASA, 1994).

As a result of this law, FAR part 12, Acquisition of Commercial Products and Commercial Services, established "acquisition policies more closely resembling those of the commercial marketplace and encouraging the acquisition of commercial products and commercial services" (FAR 12.000). Under this FAR part, the onus is on the government to define their needs "in sufficient detail for potential offerors of commercial products or commercial services to know which commercial products or commercial services may be suitable" (FAR 12.2). While this requirement may be considered more stringent on the government to frame their requirements definition, its intent to benefit the government is evidenced in that it is "reducing unique purchasing requirements . . . and obtaining goods and services faster while reducing in-house purchasing cost" (p. 22) as outlined in the GAO's 1998 Report to Congressional Committees titled "Acquisition Reform: Implementation of Key Aspects of the Federal Acquisition Streamlining Action of 1994." In this March 1998 report, findings already showed that the "number of bid protests [had] declined" at most government agencies reviewed and "the time needed to award a contract had generally decreased, thereby expediting the purchases of goods and services" (p. 3).

Since those early years of the adoption and implementation of commercial practices in federal government acquisitions, some new developments have occurred such as time-and-materials or labor-hour contract types now being able to be used under certain circumstances (FAR 12.2). This differs from the more recently established CSO contract type restriction of only fixed-price, including fixed-price incentive contracts (Tenaglia,

2022). However, the evolution of allowable contract types for commercial items/services may indicate a similar expansion could be possible for CSOs as they mature as a solicitation technique. Another notable aspect of FAR part 12 is the combined synopsis/solicitation procedure "to reduce time required to solicit and award contracts" (FAR 12.6).

The CSO class deviation deviates from FAR part 12 in that the items, technologies, or services being contracted do not need to meet the FAR definition of commerciality, even so they "shall [be] *treat [ed]* [emphasis added] . . . as commercial products or services" (Tenaglia, 2022, p. 2). Rather, a CSO is an opportunity to consider anything awarded under it as commercial for purposes of streamlining the innovative result, even for traditionally non-commercial by nature acquisitions, such as research and development (R&D) (Tenaglia, 2022). FAR part 12 procedures and clauses are assumed to be easier to award and administer the contract and provide companies an easier path to working with the government.

Finally, beyond the FAR, the DOD has recently supplemented its guidance in January 2018, and then revised it soon after in July 2019, with its *Department of Defense Guidebook for Acquiring Commercial Items*, which notes the valuable advantage of using commercial procedures to "rely . . . almost exclusively on price analysis to determine a fair and reasonable price" (Office of the Secretary of Defense, Acquisition, Technology, and Logistics [OSD/AT&L], p. 19). Any innovative solution proposed under a CSO is treated as a commercial product/service, regardless of whether it actually meets the definition of a commercial product or service found in FAR part 2 (Tenaglia, 2022). If the same innovative solution was procured under a FAR-based solicitation technique and determined non-commercial, a cost-type contract may be considered appropriate and require a more elaborate and time-consuming evaluation. The next subsection discusses contract pricing in more detail as it relates to FAR-based methods and CSOs.

3. Contract Pricing

Contract pricing is found predominantly in FAR part 15, Contracting by Negotiation. Contract price negotiation is commonly held as an area of disagreement between offerors and government negotiators; without disagreements over some aspect of

the agreement, one would have no need to negotiate at all. One of the greatest areas of disagreement centers around the certification requirement for cost or pricing data, with offerors often reluctant to provide certified cost or pricing data, citing commerciality and competition concerns (Yoder, 2004). The certification requirement is derived from the Truth in Negotiations Act (TINA), which was revised to Truthful Cost or Pricing Data in 2018. Through his research, Yoder cites a 1994 report by Coopers and Lybrand, which found that "contractor compliance with the provisions of [TINA] resulted in a 1.3% premium paid by the Government" (p. 7).

In the commercial realm, "non-traditional commercial businesses . . . could offer much-needed [supplies] and services [but] [d]ue to the overwhelming legislative and regulatory burden contractors faced when doing business with the Federal government, many potential contractors refused to conduct business in the Federal arena" (Yoder, 2004, p. 6). Professional experience shows industry feedback sessions have at times revealed that the legal, financial, and punitive risks inherent with Cost Accounting Standards (CAS) and providing defective certifications is a deterrent for potential industrial partners to propose against government solicitations. The discovery of inaccurate, incomplete, or noncurrent certified cost or pricing data by either prime contractors or their subcontractors can result in a price adjustment, profit or fee adjustment, daily interest, financial penalty, suspension, debarment, and legal exposure under the False Claims Act (2009). The effects of any one of these can be especially damaging to a contractor, leading to the preclusion of future business with the government either as a prime or subcontractor or even insolvency. Furthermore, in their research of barriers to government-industry collaboration, Tobin, Millner, and Gillete (2016) cite William C. Greenwalt's 2014 assessment that provision of cost data in conflicting formats than what is found in commercial accounting system presents a perpetual problem for commercial contractors, further identifying that the CAS that the DOD uses does not sync with Generally Accepted Accounting Principles (GAAP) adopted in the commercial world. Similarly, the GAO reported in 2016 that "some entities also viewed making their accounting systems compliant with federal standards, which could be required with traditional mechanisms, as too great a burden in terms of time or

cost" (p. 12). In total, these challenges make contract negotiation a difficult topic to navigate while securing collaboration between the government and industry.

While CSOs do not eliminate all areas of disagreement, there are crucial factors to consider which frame the planning and preparation process for price evaluation and negotiation. Specifically, contracting officers are prohibited by FAR 15.403-3(c) from requiring certified cost or pricing data when acquiring solutions through a CSO because of a critical factor, commerciality. When considering the innovative nature of solutions acquired using CSOs, data to conduct a commercial item determination as provided in DFARS 212.102(a)(iii) may be unavailable, insufficient, or even nonexistent. This limiting factor is alleviated by Class Deviation 2022-O0007, which directs contracting officers to treat solutions acquired through CSOs as commercial products or services (Tenaglia, 2021), thereby removing the applicability of certified cost or pricing data from the discussion.

Use of the CSO solicitation can only result in a commercial, fixed-price contract, eliminating the ability to contract with a cost-type contract. As reflected by Yoder (2004), this blanket designation may hinder price evaluations, negotiations, and the ability to reach a fair and reasonable price. Commerciality is an exception under Truthful Cost or Pricing Data (FAR 15.4), which precludes the government evaluation and the negotiation team(s) from obtaining certified cost or pricing data. Without certified cost or pricing data requirements, contracting officers may only require "submission of data . . . *to the extent necessary* [emphasis added] to determine a fair and reasonable price" (FAR 15.4). In consideration of this preclusion, Yoder found that offerors will often assert that their products and services are commercial, which "makes such acquisitions very challenging and risky for the contracting officer, and ultimately the taxpayer, especially when making the mandated determination of 'fair and reasonable'" (p. 14). FASA, as discussed previously in this chapter and the Federal Acquisition Reform Act (FARA) "allows for potential over-pricing in limited -or quasi-competitive markets such as the monopolies and oligopolies in which the Federal Government spends most of its dollars" (Yoder, p. 16). As a result of this commercial-item legislation, Yoder contends the "Government may no

longer have the tools required to shift the balance of pricing power in limited- or non-competitive acquisitions through the use of TINA provisions" (p. 16).

Though there are risks, removal of the cost or pricing data certification requirement does provide some benefits. Offerors benefit by alleviating the risks associated with defective pricing, which removes a powerful barrier to entry and provides for additional incentives to seek business opportunities with the government for those who deemed the certification process to be too risky for their business portfolio. The government in turn benefits by gaining a larger defense industrial base comprised of firms of innovators on the technological forefront. Offerors may still be required to provide cost or pricing data that is uncertified. As described in Yoder (2004), the keen acquisition professional will certainly identify that this exclusion may strain the price evaluation process, as such it is incumbent upon the government to ensure that the evaluation team is comprised of the necessary experts to provide a meaningful evaluation and support negotiations as necessary. The next sub-section discusses the BAA, which uses a similar process to CSOs for R&D.

4. The Broad Agency Announcement

Another notable FAR flexibility that led to the creation of CSOs is FAR part 35, "Research and Development Contracting" and its BAA solicitation process. In fact, BAAs are specifically referenced in Class Deviation 2018-O0016 as a similar solicitation technique as they are both competitively awarded in response to a general solicitation and "based on a review of proposals by scientific, technological, or other subject-matter expert peers" (Tenaglia, 2022, p. 1). The BAA process is a good comparison for CSOs as they are open-ended and less restrictive; however, BAAs can only be used for R&D acquisitions (FAR 35). FAR part 35 states that "most R&D contracts are directed toward objectives for which the work or methods cannot be precisely described in advance"; which is what the CSO resembles in looking for innovative solutions. As such, the R&D contracting process "must provide an environment in which the work can be pursued with reasonable flexibility and minimum administrative burden" (FAR 35). Again, CSOs also prioritize these advantages. Finally, "work statement should allow contractors freedom to exercise

innovation and creativity" (FAR 35). CSOs similarly only "describe . . . the agency's interest, either for an individual program requirement or for broadly defined [AOIs] covering the full range of the agency's requirements" (Tenaglia, 2022, p. 2) to allow nontraditional companies to propose the most innovative solutions that the government has not even considered.

A significant difference between R&D contracts awarded under BAAs and contracts awarded under CSOs is the contract type. FAR part 35 states that while "the Government ordinarily prefers fixed-price arrangements in contracting, this preference applies in R&D contracting only to the extent that goals, objectives, specifications, and cost estimates are sufficient to permit such a preference" (FAR 35). In contrast, CSOs must all be fixed-price (Tenaglia, 2022).

Finally, CSO proposal evaluations follow BAA procedures closely in two main ways. First, for BAAs, "the primary basis for selecting proposals for acceptance shall be technical, importance to agency programs, and fund availability. Cost realism and reasonableness shall also be considered to the extent appropriate" (FAR 35). Almost the exact same language is included in the Class Deviation for CSOs except for the cost realism analysis since cost-type contracts are not permitted (Tenaglia, 2022). Second, "written evaluation reports on individual proposals will be necessary but proposals need not be evaluated against each other since they are not submitted in accordance with a common work statement" (FAR 35). Again, almost identical language is included in the Class Deviation for CSOs. This greatly reduces protest risk for the government because there is no basis for an offeror to claim that they were treated unfairly in their evaluation compared to another offeror.

While FAR part 35's BAA solicitation can only be used for R&D contracting, CSOs include the allowance to be used for R&D contracting among other acquisition categories (Tenaglia, 2022). This allows an even broader range of contracts to be awarded under one solicitation, thus easing the administrative burden for the government and potential offerors. The next subsection discusses DIUx's original use of CSOs to acquire innovative solutions.

5. Defense Innovation Unit Experimental Commercial Solutions Opening

The term "commercial solutions opening" was coined by the DIUx (2016). DIUx was formed in April 2015, and in May 2016, Defense Secretary Carter requested that they "develop new partnerships with the private sector in communities in Silicon Valley and America's many other great innovation hubs" to "put commercial-based innovation in the hands of America's soldiers, sailors, airmen, and marines" (DIUx, 2016, p. ii). For six months after that, DIUx (2016) began utilizing a "first-of-its-kind acquisition mechanism" called the CSO to "solicit . . . solutions to problems that our warfighters are facing" (p. 1). The CSOs did not need to follow FAR requirements, and selected solutions were awarded OTs for prototype projects in as little as 31 days and within an average of 59 days (DIUx, 2016). Lauren Schmidt, pathways director at DIUx said at a forum focusing on improvements in acquisition services at the Center for a New American Security in Washington in 2016: "Not only do we get a better outcome and better project [through CSOs], but it also saves a lot of time and money. We have demonstrated through the CSO that DOD can move at the speed of business and be attractive to these [nontraditional] companies" (Docksai, 2016, para 9).

On November 30, 2016, DIUx published its "DIUx CSO How-to Guide" to cover its "lessons learned and subsequent recommendations to other DOD organizations that wish to replicate DIUx's success by leveraging the flexibilities inherent in OTs to reach out to nontraditional vendors" (p. 2). DIUx (2016) created their CSO process to be a combination of BAAs and prototype OT authority to work with innovative vendors "on a fast, flexible, and collaborative basis, using a phased evaluation process" (p. 10). DIUx (2016) posts AOIs for a "problem . . . to be solved or particular technologies [they] are interested in [without including] detailed specifications or requirements" (p. 10), which allows a broad scope of feasible solutions. It is described in plain language, and DIUx works directly with nontraditional vendors before and after its posting to encourage responses. A solution brief is submitted in Phase I, which minimizes the amount of work required of the offeror and focuses on the technology and company. Phase II consists of a pitch similar to start-up companies' pitches to venture capital firms. If DIUx is interested

in funding the technology, it moves to Phase II to request a proposal and schedule a kick-off meeting to discuss the process moving forward with the company, who oftentimes has not previously worked with the government. The offeror and DIUx then collaboratively develop a Statement of Work, payment milestones, and other details. Finally, Phase III consists of DIUx writing a recommendation to award an OT to the company for its proposal, as long as both meet statutory requirements to do so, then negotiating final terms and conditions (DIUx, 2016).

While DIUx defined a more detailed process for its original, and still used, version of the CSO, it can be gleaned that the NDAA for FY17 did take this document's overall recommendations into account for its pilot authority of its solicitation process using the same name (Assad, 2018). A key difference is that the DIUx's (2016) CSOs only results in OT awards. Since not every DOD organization has authority to award OTs, it was prudent for the class deviation to allow fixed-price FAR-based contracts. The next section discusses other research that has been conducted on acquisition innovation referencing the CSO solicitation technique.

G. OTHER RESEARCH ON INNOVATION REFERENCING COMMERCIAL SOLUTIONS OPENINGS

There is a fair amount of literature available on DIUx's specific CSO process to award OTs; however, DOD's permanent authority to utilize CSOs as a solicitation technique is less heavily discussed in the peer-reviewed research community. Deal (2020) discusses what prompted the creation of CSOs in his article, "What Commercial Solutions Openings Can Be… If We Dare." This article was written while the DOD was still under its pilot authority, but many of his points are still applicable today. He provided supporting evidence of innovative companies avoiding federal contract work because "they considered it overly distracting . . . [and] the commercial market was significantly larger and easier to negotiate with" (p. 46). Deal (2020) further explains that since the federal government has "less influence today because of the growth of commercial R&D, . . . effective CSOs should rely less on contracts that presume stronger bargaining power and more on market forces and incentives to attract nontraditional contractors" (p. 50).

A GAO (2017) report further outlines a few "challenges that deter companies from selling their products and services to the DOD . . . [as] the complexity of DOD's process, an unstable budget environment, [and] long contracting timelines" (p. 2). Additionally, GAO (2017) notes challenges such as "intellectual property rights concerns, government-specific contract terms and conditions, [and an] inexperienced DOD contracting workforce" (p. 2). The report further states that "companies choose to either not pursue DOD business or believe that their resources could be better spent pursuing commercial business where cost to compete is lower and selection decisions are made faster" (p. 2). A majority of these issues may be addressed in part by the CSO if executed effectively. This is vital since the National Defense Industrial Association reported that "the industrial base has been declining every year since 2017" (Serbu, 2023, para 2).

Additionally, Bresler and Bresler (2021) state that "the number of new vendors contracted by the military has steadily declined: in 2010, approximately 19 percent of DOD vendors had no prior defense business, compared with just 8 percent in 2019. Furthermore, exploring new vendors' Product Service Codes, we realized that most of these companies were not contracted for goods or services related to commercial innovation" (p. 7). Bresler and Bresler found this very concerning since "over the last 20 years, companies outside the traditional defense industrial base (DIB) (nontraditionals) have emerged at the forefront of innovation in areas critically important to national defense" (p. 7). To counteract this trend and attract innovative nontraditional companies, they recommend writing solicitations in clear, plain language and providing sufficient time for companies to respond to them, both of which are possible with CSOs. Deal (2020) points to CSOs' merit-based award model as "allow [ing] federal organizations to execute strategies without having to determine 'best value,' which is an involved process that requires analyses, documentation, and time" (p. 48). This is a beneficial streamlining because Deal considers that "determining 'value' in the context of innovation is not always appropriate" (p. 48). When this prolonged process is eliminated, the government can be more agile in "changing solutions or testing alternatives" and "award [ing] contracts on an ad-hoc or rolling basis through a general solicitation" (Deal, p. 48). Deal goes on to share various ways in which CSOs have been

used so far, such as the Space Force hosting a "Pitch Day" using a CSO for various solutions and awarding five contracts on the spot at the event.

Finally, Deal (2020) notes that in the pre-award phase of the CMS process, CSOs cannot just be exclusively relied upon as a general solicitation to secure innovative solutions. The government needs to use it in conjunction with significant market interaction to find capabilities of interest. There also need to be more post-award controls for structuring risks, such as fixed-price milestones and dual-use technology cost share, since a lot of these controls would otherwise be incorporated in a more traditional "best value" evaluation and pre-award process.

Two years later, Deal (2022) wrote a follow-up article titled "Innovation-Boosting Solicitations Now Here to Stay." The article discussed DOD's implementation of the permanent CSO authority and further discussed the need for it and success so far under the pilot program with $1 billion in awards made under the model to that point in February 2022. Deal (2022) reiterated the "strong incentive for industry participants to jump into the fray at any time by engaging a defense organization in creative ways (and vice versa)" (para. 12).

Additionally, two distinct research papers recovered through the NPS archives discuss acquisition of innovative solutions. Within these papers the authors briefly discuss CSOs as used by DIUx, with the primary focus areas including DIUx's use of CSOs to award OTs, as well as the use of OTs to acquire innovation at other agencies. The following parts discuss these two research papers as well as related literature and data.

1. Analysis of Other Transaction Agreements to Acquire Innovative Renewable Energy Solutions for the Department of the Navy

Though primarily focused on the use of OTs, Tobin, Millner, and Gillete's (2016) research is applicable in its total approach to understand unlocking innovation in the acquisition process. Tobin et al., through their research, found that OT authority had grown since the authority was first provided to the National Aeronautics and Space Administration (NASA). Since its inception, the authority to execute OTs has been extended to include the DOD, Department of Energy (DOE), Department of Health and

Human Services (HHS), DHS, and the Department of Transportation (DOT). Furthermore, OT authority has been extended to other Federal agencies including the Federal Aviation Administration (FAA), Transportation Security Administration (TSA), Domestic Nuclear Detection Office (DNDO), Advanced Research Projects Agency – Energy (ARPA-E), and the National Institutes of Health (NIH). Figure 4 provides the timeline of Federal Agencies gaining authority to execute OTs starting with NASA in 1958 and ending with ARPA-E in 2011. Drawing parallels between OTs as an innovative vehicle to acquire solutions and CSOs as an innovative vehicle to solicit solutions, one can surmise that CSOs as a solicitation methodology may follow a similar path as the benefits of using CSOs to acquire innovation are proliferated among the Federal acquisition community.

Tobin et al. (2016) also explore the Better Buying Power (BBP) initiatives and their relationship with innovation. BBP 3.0, issued April 2014 is the latest evolution of a campaign to improve the way DOD operates through leveraging best practices in the acquisition community. With BBP 3.0, OUSD(AT&L) identified eight core capabilities, one of which applies directly to CSOs, "remove barriers to commercial technology utilization" (Kendall, 2015, p. 9). Tobin et al. state that "this guidance is in place to ensure more timely innovation and fielding of new technology" (p. 8). Within BBP 3.0, a collaborative effort was established between multiple DOD offices to provide recommendations to "increase access to innovation" through "tasks associated with improving access to commercial technologies" (Kendall, 2015, p. 16).

Tobin et al. (2016) identify four conditions that serve as a barrier to securing partnerships with industry, namely: "stringent acquisition rules and regulations, strict audit, management, and inspection protocols, risk-adverse acquisition workforce, and firm intellectual property and data rights" (p. 29). They further point to long acquisition lead times, defense industry mergers and acquisitions, and funding unpredictability as additional inhibitors to government-industry collaboration, especially with technological innovators.

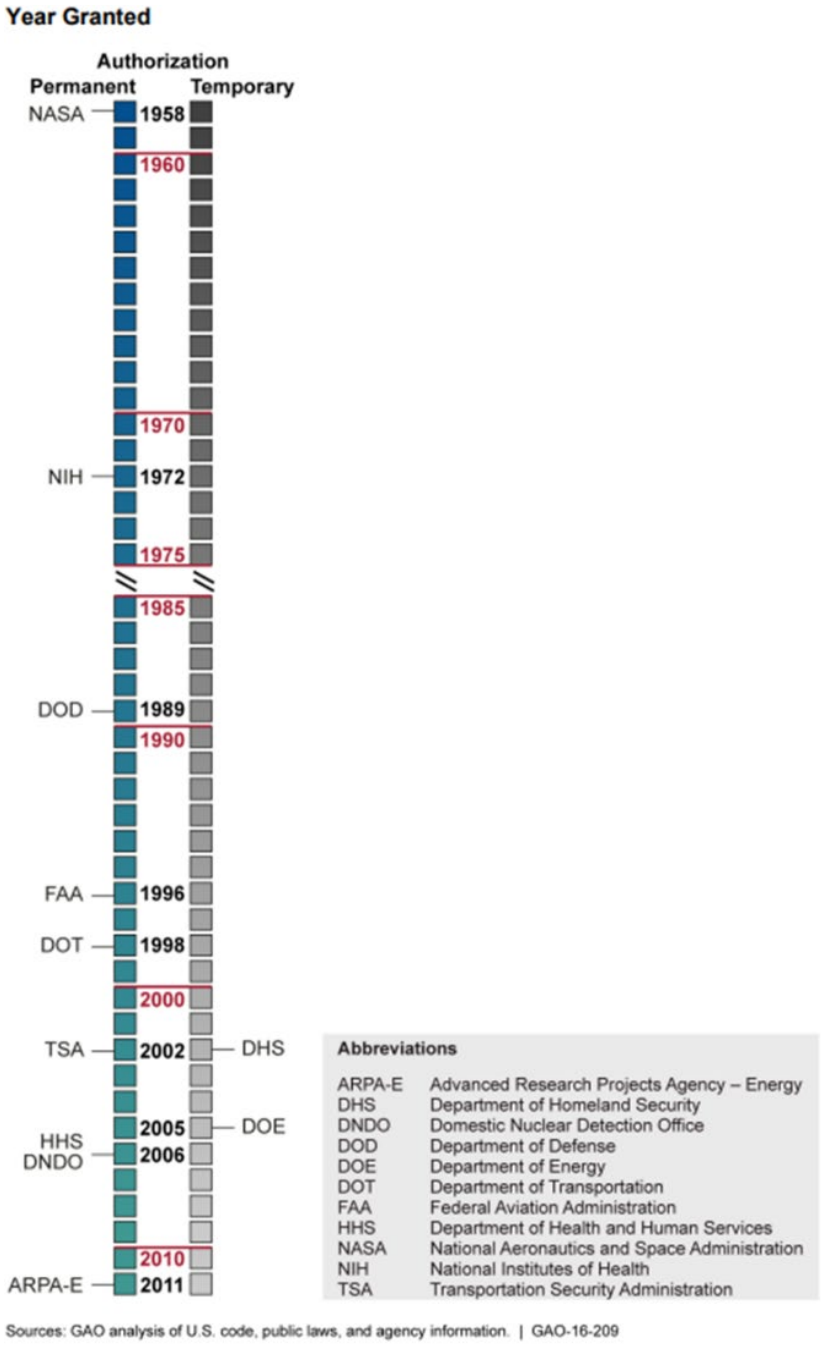

Figure 4. Agencies with Permanent or Temporary Other Transaction Authority and Year Granted.
Source: GAO (2016)

Tobin et al.'s (2016) research confirms that traditional contracting processes stifle innovation and reduce industry participation. Conversely, CSOs allow innovation to thrive.

Their research discusses a 2016 interview conducted by Lisa Ferdinando for DOD News. In the interview, then pathways director for DIUx Lauren Schmidt recognized CSOs as "chang [ing] the way the department does business" through a "much faster" acquisition process as compared to the "typical contract cycle time" of six months to a year (paras. 19–20). In the same interview, previous managing partner of DIUx, Raj Shah states that "CSO facilitates fast, flexible and collaborative work between DOD and technology companies that traditionally have not done business with the department" (para 17). Lauding the CSO process, Shah calls CSOs "reliable and transparent" that "enables us and DIUx to work at the speed of business" with a 59-day average time to award from contractor response to award of a final contract (Ferdinando, 2016, paras 12–14). In discussing the flexible and collaborative nature of CSOs, Schmidt states "Rather than coming to [offerors] with very rigid conditions they have to accept and comply with to do business with us, we actually can sit across the table from one another and actually hash out and negotiate all of the terms and conditions of the contract" (Ferdinando, 2016, para 21). Finally, closing the interview Schmidt calls the process "flexible and fast, a motivating factor for tech companies to do business with the department" (para 22).

2. Organized for Innovation: An Empirical Observation of Innovation Adoption Within Defense Organizations

Christopher Lynn (2018) conducts an empirical study of innovation adoption through a rotational assignment with DIUx supporting his research. Through his research, Lynn states that "integrating new ideas into existing organizations can tests [*sic*] one's ability to careful esteem [*sic*] underlying values and acknowledge entrenched beliefs tightly held within the adopting institution. The innovator's ability to account for existing organizational beliefs, values, and paradigms will influence their ability to effectively diffuse innovations over the long term" (p. 3). In his research Lynn discusses DIUx 2.0, a concept born from the upheaval of leadership at DIUx in 2016 wherein the OSD appointed a completely new hybrid leadership team. Lynn found that:

> By the end of the following month, the newly formed [DIUx 2.0] team oversaw the development of a new business process that would leverage its granted authority to construct creative agreements with potential companies. The [CSO], primarily constructed by DIUx's Pathways team,

> was a sleek and user-friendly mechanism for the DOD to become a non-dilutive investor in new and emerging technologies. The CSO provided a business arrangement that was both familiar and compatible to the start-up community of [Silicon Valley]. By the end of the year, 12 agreements had been reached using the CSO process. (p. 12)

Lynn's (2018) research revealed that "with the CSO [at DIUx] in place, the commercial community moved swiftly to participate, however it would take more time to convince DOD customers of its potential" (p. 28). As a business process at DIUx, CSOs are "used to deliver innovation technologies to meet mission-critical needs of DOD's warfighters;" CSOs allowed DIUx to "swiftly access commercial technology, while operating along the parameters of existing regulations" (Lynn, 2018, p. 30). The next section provides a summary of Chapter II and a preview of Chapter III of this report.

H. SUMMARY

This literature review began with a discussion of the Innovation Theory before providing a discussion of CSO legislative history, policy, and procedures. It discussed other acquisition reform efforts and provided a summary of the CMS. The chapter then discussed DOD's application of the CMS through acquisition planning and market research, acquisition of commercial products and services, contract pricing, and the BAA. DIUx's version of the CSO, the most immediate precursor to the CSO as defined in this research, was examined before other research conducted regarding CSOs and innovative solicitation techniques was discussed. The next chapter will discuss the various methods to be used in gathering CSO user feedback and data for its assistance in answering the research questions.

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III. METHODOLOGY

A. INTRODUCTION

The previous chapters introduced concerns surrounding acquisition processes, explored the environment leading to the development of CSOs as a solicitation technique, and discussed other research done about innovation and CSOs. This chapter will present the methodology of data collection for this research. The first section will explain how strengths, weaknesses, and best practices will be categorized. Then we will provide an explanation of how CSO user feedback will be collected through CSO Cross Talks and other published briefings and reports to answer the first three research questions of identifying strengths, weaknesses, and best practices. Finally, this section will explain the methodology of quantifying DOD's procurement lead time through the use of data from the FPDS to answer the fourth and final research question of whether a statistical difference exists between CSOs and FAR-based solicitations.

B. IDENTIFICATION OF STRENGTHS, WEAKNESSES, AND BEST PRACTICES

With strengths, weaknesses, and best practices at the core of this research's primary questions, it is important to define those terms. A strength indicates an aspect of the CSO solicitation technique that has benefited the government, industry, or both. Examples could include an easier process to contract award than FAR-based procedures, reduced risk of protest, contracts for more innovative solutions than the government could have defined in a requirements statement, etc. A weakness would indicate an aspect of the CSO that has hindered the government, industry, or both. Examples could include a more confusing process than FAR-based procedures, difficulty in securing a fair and reasonable price for the government, uncertainty for how to award follow-on contracts to initially innovative solution contracts, etc. An observation may have attributes that result in both a strength and weakness.

A best practice is defined by Merriam-Webster (n.d.) as "a procedure that has been shown by research and experience to produce optimal results and that is established or

proposed as a standard suitable for widespread adoption." Examples could include implementing an agency-specific CSO guidebook, using a gated/phased approach for CSO proposal submissions, advertising CSOs through unconventional means, etc. Not all observations may qualify as a strength, weakness, or best practice but still enhance or contribute to this research or areas for future research; those observations will be captured as "other observations" in Chapter IV. The next section will describe the methodology for gathering CSO Cross Talk data.

C. COMMERCIAL SOLUTIONS OPENING CROSS TALKS

CSO Cross Talk meetings started being held quarterly in April 2022 as a forum for the DOD contracting workforce to share "CSO policy changes, training, and success stories / best practices" (DOD,). DOD agency points of contact who have previously conducted CSOs share varied interpretation and implementation of the flexible solicitation technique to meet their specific program and agency goals. This is in an effort to benefit all those working to develop CSO policies/procedures at their individual agencies, whether they have used them yet or not. Participants are encouraged to ask questions and suggest hot topics surrounding CSOs. SAF/AQC representatives organize and facilitate the meetings, and afterwards, they draft CSO Cross Talk Bulletins to summarize the meetings. These bulletins are disseminated with guidance for meeting attendees to share among their respective DOD agencies' acquisition workforces.

For this research, the contents of these bulletins, primarily based on the feedback provided by DOD agency points of contact who have previously conducted CSOs, will be reviewed and analyzed, particularly regarding CSO strengths, weaknesses, and best practices. While a policy analyst or contracting officer may just read these bulletins and try to take mental notes for potential future use, this research will systematically break down all feedback data and categorize it by topic area to lend itself more readily to making strategic recommendations about actions that can be taken regarding CSOs. The four overarching categories are:

1. Training and Information Sharing – how the workforce is educated on this solicitation technique,

2. Internal Agency Processes – how individual DOD agencies structure their facilitation of evaluating and awarding CSOs,

3. Solicitation Definition – how various Contracting Officers draft individual CSOs, and

4. Industry Interaction – how the government advertises to and receives information from potential offerors.

These four categories are purposely broad to accommodate finding space for a diverse range of feedback since the DOD agency points of contact were not required to structure their Cross Talk presentations in any particular way. Once the feedback is separated into these categories, then strengths, weaknesses, and best practices can be identified among them. Furthermore, commonalities and focus areas for recommendations can be consolidated. The next section will discuss the research methodologies to be used in analyzing other published briefings and reports.

D. OTHER PUBLISHED BRIEFINGS AND REPORTS

Published briefings and reports will be reviewed from various sources including congressional committees and GAO reports. The contents of the reports will be analyzed for strengths, weaknesses, and best practices, and then categorized accordingly. The GAO and United States Court of Federal Claims (COFC) archives will also be reviewed for protest reports. The contents of these reports will then be analyzed for strengths, weaknesses, and best practices, and then categorized accordingly. The next section will discuss the methodologies to analyze data about CSOs and resulting contract awards.

E. PROCUREMENT LEAD TIME DATA ANALYSIS

As provided in Chapter II, DIUx has realized notable decreases in their acquisition timelines by using CSOs. This research will attempt to quantify DOD's procurement lead time efficiencies through the use of data from the FPDS. The FPDS is a data reporting tool that captures contract data about each reportable contract action, that is each contract action over the micro-purchase threshold, including awards, modifications, and orders (FAR 4.6). Data is then made available through the System for Award Management (SAM) reporting

tools and can be analyzed across a myriad of data fields. SAM reports can produce standard reports containing predefined criteria or a user can create ad-hoc reports within which the user can define the specific criteria including filters, reported fields, and format. To support reporting GSA maintains a Data Element Dictionary which explains each available data element collected through contract action reporting (General Services Administration [GSA], 2023). This research will use ad-hoc reports of contract data with the report criteria as provided in Table 1. Summary data tables are provided in Appendix B of this report.

Table 1. SAM Ad-Hoc Report Criteria

Field	Description[a]	Criteria
Date Signed	"The date that a mutually binding agreement was reached" (p. 23)	Oct 1, 2019 ≤ date signed ≤ Jan 1 2023
Solicitation Date	The date the solicitation was issued	Oct 1, 2019 ≤ solicitation date
Base and All Options Value (Total Contract Value)	"The mutually agreed upon total contract value including all options (if any)" (p. 30)	<$100,000,000
Contracting Agency ID	"The code for the agency of the contracting office that executed or is otherwise responsible for the transaction" (p. 37)	Equals 1700 (Navy), 2100 (Army), and 5700 (Air Force)
Solicitation ID	"Identifier used to link transactions in FPDS to solicitation information" (p. 20)	Is Not Null
Modification Number	"An identifier . . . that uniquely identifies one modification for one contract, agreement, order, etc." (p. 17)	Equals 0

[a] Source: GSA Federal Procurement Data System (FPDS) Data Element Dictionary (2023).

This research will conduct two-sample *t*-test analyses of procurement times for each population set. Through the analyses we will attempt to determine whether a significant difference in procurement times exists between the CSO solicitation process and FAR-based solicitation approaches. Procurement time will be defined as the days from the solicitation issuance date to the date of award, comparing mean procurement times for

acquisitions that use CSOs with that of requirements sourced through FAR-based means such as request for quotes and requests for proposals. As multiple awards can be made from a single CSO, only the days-to-first award will be considered. Days-to-first award will be determined by considering the total set of awards issued pursuant to a CSO solicitation and selecting the earliest award date to include in the CSO sample. Only FAR-based awards made between October 1, 2019, and January 31, 2023, will be considered. Data will be segregated into eight distinct populations in sets of two, resulting in one population set for actions below the Simplified Acquisition Threshold (SAT), one population set for actions between the SAT and $4.99M, one population set for actions between $5M and $99.99M, and one population set for all actions below $100M. CSOs will be identified by the inclusion of "S" and "C" in the ninth and tenth positions of the solicitation ID, allowing for the segregation of the data into the two distinct population sets. Table 2 provides a complete description of the samples and populations to be used in the analyses, including the selected notations. Table 3 provides the justification used in establishing each population set.

Table 2. Description of Populations and Notations for Statistical Analysis

Population Set	**Population**	**Criteria**	**Notation Example**
(i) Below SAT		Contracts with award value < $250K	
	Awards from CSO solicitation		$N_{CSO(i)}$
	Awards from FAR solicitation		$N_{FAR(i)}$
(ii) Between SAT and $5M		Contracts with award value ≥ $250K and < $5M	
	Awards from CSO solicitation		$N_{CSO(ii)}$
	Awards from FAR solicitation		$N_{FAR(ii)}$
(iii) Above $5M		Contracts with award value ≥ $5M and < $100M	
	Awards from CSO solicitation		$N_{CSO(iii)}$
	Awards from FAR solicitation		$N_{FAR(iii)}$
(iv) Total Population		All contracts with award value <$100M	
	Awards from CSO solicitation		$N_{CSO(iv)}$
	Awards from FAR solicitation		$N_{FAR(iv)}$

Table 3. Population Justifications

Population Set	Justification
(i) Below SAT	Acquisitions under the SAT are generally expedited when compared to non-SAT acquisitions, regardless of the solicitation methodology chosen, therefore the SAT provides a logical cutoff for the first set population set.
(ii) Between SAT and $5M	Acquisitions of $5M and above have additional reviews and approvals required by many agencies. For example, the Air Force, who has executed the preponderance of DOD's CSOs, requires additional clearance reviews starting at $5M. To ensure parity in the data $5M will be used as the demarcation point to segregate the data samples.
(iii) Above $5M	CSOs above $100M require special approval from the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)) and therefore the procurement time is elongated through additional reviews and oversight. There are many additional factors for these larger-dollar procurements that challenge comparison with the data presently available through SAM. Analysis of actions above $100M would require a level of analysis that exceeds the scope of this research and therefore these actions will be excluded from the statistical analysis.
(iv) Total Population	The total population sets of CSOs and FAR solicitations resulting in award below $100M, enabling a wholistic analysis of the two distinct populations.

Collectively, each population set will be tested against the following hypothesis with a confidence interval of CI = .90 (α=.10).

$$H_0: \mu_{CSO} = \mu_{FAR} \quad (1)$$

$$H_1: \mu_{CSO} \neq \mu_{FAR} \quad (2)$$

As discussed in Chapter I, data quality and quantity are limitations of this research. The quantity of CSO data may not be sufficient to test the hypothesis for each population set; in those instances we will make informed inferences from the available data. Furthermore, the quality of FPDS data may necessitate the elimination of outliers from the data sets; in the event outliers are removed, they will be discussed and disclosed in Chapter IV.

Once the *t*-test analysis is complete, it may be possible to further subdivide the data into individual agencies to aid future research. If possible, that data will be provided as an element in Appendix B to this report. The next section of this report will provide a summary of Chapter III as well as an introduction to the next chapter, Findings and Discussion.

F. SUMMARY

This chapter discussed the methodology of data collection for this research. The first section shared how CSO Cross Talks user feedback will be analyzed and categorized before discussing similar analysis for other published briefings and reports to answer the research questions of identifying strengths, weaknesses, and best practices. Finally, this section explained the methodology of quantifying DOD's procurement lead time through the use of data from the FPDS to answer the fourth and final research question of whether a statistical difference exists between CSOs and FAR-based solicitations. The next chapter explores the findings and discussions resulting from these data analyses.

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IV. FINDINGS AND DISCUSSION

A. INTRODUCTION

The previous chapter explained the research methodology. This chapter provides the findings from the CSO Cross Talks, other published briefings and reports, and procurement lead time data analysis. It then provides the implications of those findings before concluding with recommendations for the DOD, contracting organizations, and Procuring Contracting Officers (PCOs) based on the analysis results.

B. FINDINGS

This section provides the individual strengths, weaknesses, and best practices identified as a result of our analysis of the CSO Cross Talks, other published briefings and reports. The strengths, weaknesses, and best practices are preceded by a general summary of the analyzed elements. Following this analysis, this section provides the procurement lead time data analysis to determine whether a significant difference exists in the procurement lead times of contracts awarded by CSO solicitations as compared to those awarded using FAR solicitation techniques.

1. CSO Cross Talk Findings

It may appear easy for one to predict potential strengths, weaknesses, and best practices of any new technique based on its developer's intention or motivation, but having the firsthand experience to back up those findings and open oneself up to questions about them is another matter entirely. The CSO Cross Talks did just that starting in April 2022. As previewed in the methodology section, the below feedback, consolidated from various agency representatives, is categorized into broad categories to highlight possible focus areas on which to capitalize for recommendations. As provided in Chapter III of this research, we reviewed the CSO Cross Talks and developed categories under which to align our findings. The four categories, developed specifically for this research, are Training and Information Sharing, Internal Agency Processes, Solicitation Definition, and Industry Interaction. Through this analysis, we have captured the strengths, weaknesses, and best

practices in Table 4, Table 5, Table 6, and Table 7, using the identifiers 'S', 'W', and 'BP' respectively. The individual observations are not listed in priority order. Furthermore, some findings indicate 'BP' with 'S' or 'W' in parentheses afterwards to note that this is a best practice based on, or that resulted in, an observed strength or weakness. The first category we identified is Training and Information Sharing, which covers observations related to how the workforce is educated on the CSO solicitation technique. The findings under this category are provided in Table 4.

Table 4. CSO Cross Talks—Training and Information Sharing

Category	Findings
BP (S)	Contracting organizations should create training team to do deep dive into tactical processes for each CSO spiral, identify best practices, and target areas that are historically performed inconsistently (Resulted in 3-month award time savings, helped mitigate protests, and expedited purchases).
BP (W)	PCOs should understand that there are different challenges than a typical acquisition because solutions can vary widely (e.g., type of money needed, bona fide need, base spectrum approvals, Authorization to Operate requirement).
BP	DOD should stand up Outreach Team to equip acquisition professionals with training, best practices, success stories, resources, and DOD level and industry collaboration opportunities.
BP	DOD and contracting organizations should train on CSO policy/procedures to show difference from FAR-based acquisitions (e.g., know what processes/documents affect each contract from CSO level vs. individual contract level).
BP	DOD and contracting organizations should be educated on what authorities, regulations, and policies are available and how to differentiate among them.

Adapted from DOD (2022a)

The next category we identified is Internal Agency Processes, which we defined as how individual DOD agencies structure their facilitation of evaluating and awarding contracts as a result of the CSO solicitation technique. The findings under this category are provided in Table 5.

Table 5. CSO Cross Talks—Internal Agency Processes

Category	Findings
S	Contracting organizations' PCOs obligated awards competitively, within 60 days, and with substantial negotiated savings.
BP (S)	Contracting organizations should assign a PCO to chair the execution team (significant amount of confusion and rework reduced by establishing a PCO at the head of the evaluation and execution teams).
W	PCOs did not observe awards from CSOs as a short process or end of year effort due to multiple workshops, time to develop problem statements, and acquisition process taking numerous months.
W	Contracting organization observed a lack of accurate CSO data reporting for DOD as a whole.
BP (W)	Contracting organization required a large team to evaluate over 500 submissions for different organizations in a reasonable amount of time.
BP (W)	PCOs should ensure funding is ready to obligate from their program offices in order to move quickly to reduce or scale the requirement based on the available funding and award quickly (waited on funding for eight months in one instance.).
BP	Contracting organizations and PCOs should establish a cloud-based document repository. The CSO process' fast pace required an organized central repository for emails, documents, and spreadsheets that could be accessed by many and restricted as necessary. PCOs should decide how they will share documents with those that are not able to access the cloud-based document repository (e.g., contracted technical evaluators).
BP	PCOs should make sure all processes, procedures, and contractor responses under the CSO are uniform (also applies to Solicitation Definition section).

Category	Findings
BP	PCOs should ensure acquisition/evaluation teams are filing electronic documents in a standardized manner.
BP	PCOs should rely on program managers and technical specialists to frame Statements of Work and contract line item number (CLIN) structures.
BP	PCOs should work with DCMA at the onset if they will be assisting with pre-award surveys or post-award administration.
BP	PCOs should work closely with legal support to avoid issues with wide range of solutions.
BP	PCOs should create/maintain relevant documentation.
BP	PCOs should ensure subject matter expert (SME)s perform robust technical evaluations.
BP	PCOs should negotiate price and terms and conditions bilaterally (after proposals are solicited competitively), in line with industry's normal practices.
BP	Contracting organizations should plan appropriately to facilitate shorter procurement acquisition lead times (e.g., hiring/assigning additional personnel and deprioritizing team's other workload to award high dollar requirements in a compressed timeline).
BP	Contracting organizations and PCOs should establish central document repository for oversight and surveillance documents.
BP	Contracting organizations should establish a unified contracting division for CSO solicitations and awards.
BP	Contracting organizations and PCOs should integrate acquisition professionals and SMEs in acquisition planning and development.
BP	PCOs should establish relationships among stakeholders.
BP	PCOs should ensure consistent socialization and communication of timeline, plans, and processes.

Adapted from DOD (2022a, 2023)

The third category is Solicitation Definition which lists findings about how various Contracting Officers draft individual CSO solicitations. The findings under this category are provided in Table 6.

Table 6. CSO Cross Talks—Solicitation Definition

Category	Findings
S	Contracting organizations observed that every agency/sub-unit/etc., has its own unique requirements; even if another part of DOD has contracted for a certain product/service, it could be considered "new/innovative" to your specific part of DOD and warrant an award from a CSO.
BP (S)	PCOs should draft CSOs with a phased approach (e.g., abstracts and oral presentations) to reduce workload for both government and contractor.
BP	PCOs should provide enough background/contextual information for the problem statement or AOI in the CSO in order for offerors to successfully propose.
BP	PCOs should standardize evaluation criteria across the AOI (each solution will still be different, but can be assessed based on its unique ability to respond to the government requirement).
BP	PCOs should adjust scope and specificity of CSO language based on individual circumstances.

Adapted from DOD (2022a, 2023)

Finally, the last category we identified is Industry Interaction which captures how the government advertises to and receives information from potential offerors under CSO solicitations. The findings under this category are provided in Table 7.

Table 7. CSO Cross Talks—Industry Interaction

Category	Findings
BP (S)	Contracting organizations and PCOs should consider use of AFWERX Google Suite as a secure one-stop shop for correspondence, documentation, and meetings with vendors (proved to be an effective tool resulting in 6-month award time savings).
BP	PCOs should allow industry to have access to and communication with end users in a controlled way.
BP	PCOs should survey industry for inputs into the CSO process.
BP	Contracting organizations and PCOs should use social media and a wide variety of online options to reach potential offerors (some market segments, like cyber, will actively avoid resources that are too associated with the government).
BP	PCOs should encourage program managers to reach out through their contacts and colleagues for potential offerors.
BP	Contracting organizations and PCOs should learn about the market segments they are trying to attract and how they typically find opportunities.

Adapted from DOD (2022a)

2. Other Published Briefings and Reports

Through the analysis we additionally reviewed congressional briefings, GAO protests, and COFC protests. Within these various analyses we reviewed the briefings and reports to further identify strengths, weaknesses, and best practices, in line with our primary research questions. The results of these analyses are provided in this subsection.

a. Congressional Findings

In the conference report for the FY 2021 NDAA (2020), Congress expressed its expectation that the DOD provide "a detailed justification to reauthorize this [CSO] instrument and associated flexibilities" (Conference Report 116–617, p. 1717). Furthermore, the report required the Secretary of Defense to "collect data on the specific

cases, synthesize best practices, develop appropriate educational and training activities for the use of this authority, and to ensure such content is made available to the Department's acquisition workforce" (p. 1717). Accordingly, the USD(A&S) submitted their report in March 2021, followed by a supplemental briefing in June 2021 titled "Briefing to Congressional Defense Committees; Department of Defense Commercial Solutions Openings."

The budget planning process is the standard process for establishing and authorizing the annual national defense budget and includes congressional committee reviews of the annual presidential budget request. At the same time as the USD(A&S) briefing (2021) was provided, the congressional defense committee for the FY 2022 budget planning process was considering, marking, and responding to the presidential budget request for FY 2022. Figure 5 illustrates that in June 2021, when the USD(A&S) briefing occurred, Congress was in the depths of establishing the FY 2022 NDAA. The date of the USD(A&S) briefing is approximated by the red line in Figure 5. Through this, we surmise that the USD(A&S) report and briefing (2021) were critical enablers of the permanent CSO authority, as these activities occurred during the FY 2022 budget planning process, which led to the FY 2022 NDAA (2021), wherein the permanent authority to solicit using CSOs originated and was codified in section 803 of the Act.

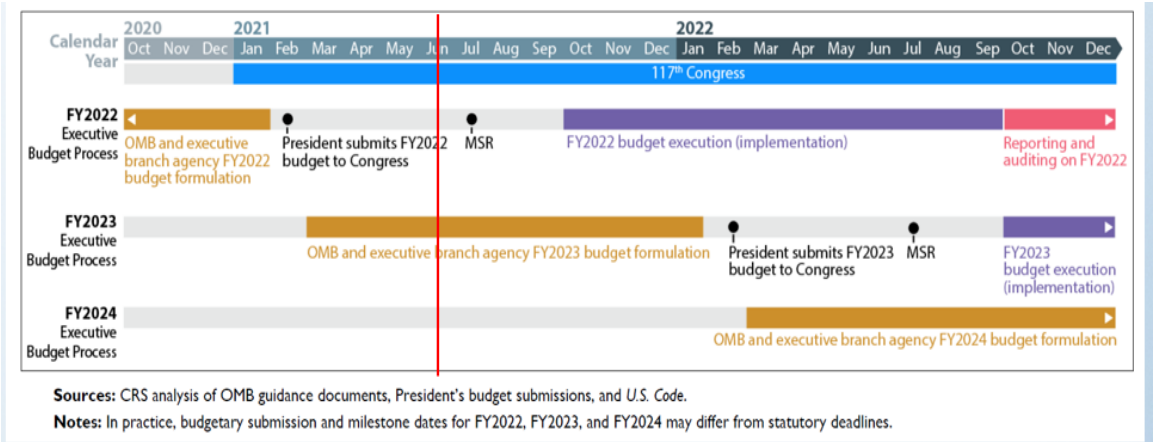

Figure 5. Defense Budget Planning Process.
Adapted from P. J. Candreva (PowerPoint Slides, October 11, 2022)

Through their analysis, USD(A&S) (2021) found that CSOs "lower barriers to entry through reduced procurement documentation compared to traditional solicitation and source selection process," and "open [s] DOD markets to businesses that did not previously work with the Government" (p. 6). Furthermore, the USD(A&S) found that CSOs "often [provide] better solutions than what the government initially envisioned" (p. 7). As a result of their findings, the USD(A&S) reported their express intent to increase application of CSOs, coupled with their strong support in making the authority permanent. In their briefing, USD(A&S) also obtained utilization data on a total of 110 DOD CSOs. They further attached questionnaire responses from 31 projects, across the USAF, Army, and Defense Health Agency. The quantity of responses by DOD Department is provided in Table 8.

Table 8. Quantity of Responses to USD(A&S) Questionnaires by Department

Military Department	**Questionnaire Responses**
Department of Air Force	27
Department of Army	1
Defense Health Agency	3

The depth of the USD(A&S) (2021) questionnaire response provided a means to review each response and extract identified strengths and weaknesses. From the analysis of the USD(A&S) analysis, we developed four categories and catalogued each finding accordingly. These categories differ from the CSO Cross Talk categories as they are more static observable topics rather than improvements to be made. Similar to the analysis of Cross Talk findings, the tables that follow annotate strengths with an 'S' and weaknesses with a 'W'. The first category we established in the analysis of the USD(A&S) 2021 questionnaires is Expanded Solutions Horizons. We define this category as an observation that allowed the government to consider new methods, some of which had not previously been envisioned, in accomplishing the objectives or AOIs. These findings are provided in Table 9.

Table 9. USD(A&S) (2021) Questionnaire—Expanded Solution Horizons

Category	Findings
S	Even for previously competed requirements, CSOs can provide new and innovative ways to accomplish objectives and reduce prices at the same time.
S	The CSO solicitation process brought awareness to the government team of goods and services not specifically solicited or envisioned.
S	The CSO responses allowed the requirements owner to obtain a solution even with "extremely limited technical expertise" (p. 27) in the specific technical field (augmented reality). This approach allowed for the offeror to fully leverage their expertise in developing the technical solution, including the final specification.

The second category we established in this analysis is Industry Participation and Competition. We define this category as an observation that aligns with offerors, including potential offerors, engagement with the CSO solicitation. This category also considers the impact of industry participation in its effect on increasing or decreasing competition in accomplishing the objectives or AOIs. These findings are provided in Table 10.

Table 10. USD(A&S) (2021) Questionnaire—Industry Participation and Competition

Category	Findings
S	As intended, the government received proposals from nontraditional startup companies.
S	The CSO was successfully used in place of a sourcing strategy that would have typically been a sole-source to a known provider.

The third category we established is Cost/Price/Budgeting, which captures observations aligned with agency budget planning and execution as well as impacts to the

price of solutions acquired through the CSO solicitation technique. These findings are provided in Table 11

Table 11. USD(A&S) (2021) Questionnaire—Cost/Price/Budgeting

Category	Findings
S	In one instance, the government contracted at a value that was half the value expected through traditional means.
W	Government estimates often fail to consider all possible approaches and developing a structured Independent Government Cost Estimate (IGCE) is challenging with CSOs. This inhibits the budgetary planning process and removes the IGCE as a tool to determine price reasonableness.

The final category we established is Schedule and Planning, which captures observations that align with the early acquisition planning process, including the formation and execution of the acquisition schedule. These findings are provided in Table 12.

Table 12. USD(A&S) (2021) Questionnaire—Schedule and Planning

Category	Findings
S	Significant schedule savings were widely reported, with up to 50% schedule savings in one instance.
W	Failure to coordinate with SMEs and stakeholders for connected systems and processes (i.e., Information Technology (IT), cyber security, logistics) can lead to failure; one project was cancelled after selection "due to insurmountable cyber security concerns" (p. 33).

Following the analysis of strengths and weaknesses, we identified six distinct best practices agencies should consider when developing and soliciting solutions using the CSO

solicitation technique. Unlike the best practices identified from the CSO Cross Talks, the best practices identified from the USD(A&S) (2021) questionnaires are process-oriented and broad in nature, preempting the assignment of categories. The best practices are provided in Table 13.

Table 13. USD(A&S) (2021) Questionnaire—Best Practices

Category	Findings
BP	The agency should expand announcement mediums to make as many small businesses as possible aware of requirements. This could include the use of existing government point of entry (GPE)s to generate interest and the use Chamber of Commerce to generate additional interest and awareness.
BP	The government purchase card proves to be a flexible means for rapid funding of awarded projects, with many USAF actions awarded "on the spot" (p. 14, 16, 38, 40, 42, 44, 46) following briefings/presentations of solutions.
BP	If solutions do not meet government need, agencies should recognize these limitations and not feel compelled to award.
BP	Critical analysis is necessary, as requirements owners may try to submit AOIs seeking a CSO for an already fully-formed requirement, due to the perceived expeditious nature of the CSO process.
BP	Agencies should consider life cycle costs as part of the overall affordability for solutions solicited.
BP	Agencies must coordinate with SMEs and stakeholders for connected systems and processes (i.e., IT, cyber security, logistics).

In addition to the strengths, weaknesses, and best practices, we found a single instance where the USAF sought a solution for temperature fluctuations of fuel containers in Alaska. Through a CSO solicitation they were able to achieve timely delivery prior to freezing temperatures, achieving "rapid contract execution" (USD[A&S], 2021, p. 35) as a result of the CSO solicitation.

b. Protest Findings

In total, there are four published GAO protests (GAO 2018, GAO 2022b, GAO 2022c, GAO 2022d) in response to awards made through the CSO solicitation. Three were denied and one sustained. For the sustained protest, it is important to note that it was sustained on the grounds that the Army improperly engaged in an OT for production following the prototype stage and was not a protest resultant of the CSO process itself aside from the absence of the necessary OT production follow-on language in the solicitation itself. The specific processes for OTs are beyond the scope of this research. In addition to the GAO protests, we reviewed one judgement from the COFC (Kinemetrics, Inc. v. United States and Nanometrics, Inc., 2021). From the review of these proceedings, we attempted to identify the strengths and weaknesses; however, no weaknesses could be identified. The findings were catalogued into four distinct categories, with some findings falling into multiple categories.

The first category we established in the analysis of the protest findings is Industry Participation and Competition. Borrowing from our previous definition, we define this category as an observation that aligns with offerors, including potential offerors, engagement with the CSO solicitation. This category also considers the impact of industry participation in its effect on increasing or decreasing competition in accomplishing the objectives or AOIs. These findings are provided in Table 14.

Table 14. Protest Decisions—Industry Participation and Competition

Category	Findings
S	In response to a Small Business Innovative Research (SBIR) CSO for a Space Force pitch day topic, the USAF received 366 proposals and were able to fund 46 of them within a budget of $2.5M.

The second category we established in this analysis is Expanded Solutions Horizons. Again, borrowing from our previous definition, we define this category as an observation that allowed the government to consider new methods, some of which had not

previously been envisioned, in accomplishing the objectives or AOIs. These findings are provided in Table 15.

Table 15. Protest Decisions—Expanded Solution Horizons

Category	Findings
S	In response to a SBIR CSO for a Space Force pitch day topic, the USAF received 366 proposals and were able to fund 46 of them within a budget of $2.5M.

The third category we established for the protest analysis is Process Flexibility, which captures observations aligned with latitude given to the government to define the solicitation processes and to define the importance of individual approaches and technologies proposed. These findings are provided in Table 16.

Table 16. Protest Decisions—Process Flexibility

Category	Findings
S	GAO (2022b) did not take issue with the agency's flexibility in determining "importance to agency programs" (p.8) where proposals were rank-ordered by evaluating technical merit and price.
S	Contracting Officers are given flexibility under the CSO authority to state a solicitation closing date and hold offerors accountable to delivering proposals on time.
S	GAO has upheld that agencies have wide latitude and discretion in determining proposals to fund in consideration of their unique needs and funding availability.
S	In reviewing responses to CSOs, GAO (2022d) has found that individual contracting agencies are afforded "broad discretion to determine their needs and the best way to meet them" (p. 4).

Category	Findings
S	GAO (2022d) has affirmed that discussions are not required under CSOs, but notes that when discussions do occur they must be conducted "fairly and reasonably" (p.5).
S	COFC (2021) recognizes "judicial deference" (p. 2) in the evaluation process for CSOs due to their "sophisticated evaluation" (p. 2) and use of peer reviews to evaluation proposals.
S	COFC (2021) upheld precedent that when conducting a CSO solicitation, and in consideration of identifying the "best approach" (p. 10), agencies may exercise their own discretion in shaping the scope of evaluation factors, including considering intrinsic elements of the factors, even though not provided explicitly in the CSO solicitation.

The final category we established is Scope of Litigation which captures observations that either limit or enhance protest risk by considering the scope of complaints allowed in litigation. These findings are provided in Table 17.

Table 17. Protest Decisions—Scope of Litigation

Category	Findings
S	GAO has upheld that agencies have wide latitude and discretion in determining proposals to fund in consideration of their unique needs and funding availability.
S	GAO's review of CSOs is specifically constrained to acts of bad faith, regulation violations, and a review of the agencies handling of specific solicitation provisions.
S	In reviewing responses to CSOs, GAO (2022d) has found that individual contracting agencies are afforded "broad discretion to determine their needs and the best way to meet them" (p. 4).
S	COFC (2021) has found that while it has jurisdiction to hear protests of CSO procurements, "it can only evaluate whether the government followed its own process" (p. 2).

Category	Findings
S	COFC (2021) recognizes "judicial deference" (p. 2) in the evaluation process for CSOs due to their "sophisticated evaluation" (p. 2) and use of peer reviews to evaluate proposals.
S	COFC (2021) upheld precedent that when conducting a CSO solicitation, and in consideration of identifying the "best approach" (p. 10), agencies may exercise their own discretion in shaping the scope of evaluation factors, including considering intrinsic elements of the factors, even though not provided explicitly in the CSO solicitation.

Following the analysis of strengths and weaknesses, we identified four distinct best practices agencies should consider when developing and soliciting solutions using the CSO solicitation technique. Similar to the findings from the USD(A&S) (2021) questionnaires, the best practices identified from the protest decisions are process-oriented and cannot be clearly categorized in a similar manner to the strengths and weaknesses. The best practices are provided in Table 18.

Table 18. Protest Decisions—Best Practices

Category	Findings
BP	Establish transparency and consistency with rating criteria, which provides for defensibility against CSO protest. In one example the agency provided a clear scoring matrix in the CSO which helped the agency achieve protest dismissal.
BP	Agencies should ensure sufficient documentation is developed and maintained. Doing so supported meaningful reviews of the file and determination process, which were critical to support GAO's decisions.
BP	Agencies should ensure the AOIs solicited and solutions sought materially align.

Category	Findings
BP	When amendment to a CSO solicitation is necessary, the agency should ensure that any new evaluation or selection methodologies align with previously stated criteria.

In one instance, the GAO (2022b) upheld "importance to agency programs and fund [s] availability" (p.6) as evaluation criteria, even though these criteria were unstated in the solicitation, referring to the relevant CSO authority which requires they be considered in evaluations. It is also noteworthy that GAO (2022d) has recognized CSOs as a means to emphasize "scientific and technological innovation and has as its objective the development of new technology" (p. 5), bolstering the government against singular protests of disagreements with the agency's judgement. Following these analyses, we conducted an analysis of FPDS data to analyze procurement lead times. The next section discusses the statistical analysis of procurement lead times and the differences between procurement lead times of contracts awarded from CSOs and those awarded through FAR-based solicitations.

3. Procurement Lead Time Data Analysis

Using the criteria established in Chapter III, we conducted a statistical analysis of the procurement lead time as reported in the FPDS to test the hypotheses established in equation 1 and equation 2. The initial query returned 114,952 individual contract actions. This data was then analyzed to remove modifications and, in the instance of multiple awards made from the same solicitation, all contract actions following the earliest award date were removed. Following these adjustments, 56,676 individual contract actions were examined to identify the existence of any erroneous data or outliers.

a. Elimination of Outliers

Upon examination of the data, we discovered that 5.6% of the days to award (x) were reported as either 0 or 1. Individually, these values comprised 3.8% and 1.8% of the total population data respectively. The complete frequency (f) and relative frequency (f/n)

distributions of the data with $x \leq 5$ is provided in Table 19. In the researchers' personal experience and observations, achieving contract award less than two days following the solicitation is very rare. In line with the quality limitations discussed in Chapters I and III of this research, we considered these values to be the result of reporting errors, and therefore determined them to be outliers. Additionally, the data suggests that the minimum procurement time following a CSO solicitation ($Min_{CSO(iv)}$) is $x=2$ days. Eliminating outliers with a value below the $Min_{CSO(iv)}$ provides for a more reasonable basis for comparison to complete this research without compromising the integrity of the research or data. The outliers accounted for 3,161 individual contract actions, the elimination of which left 53,515 contract actions ($N_{CSO(iv)}=31$, $N_{FAR(iv)}=53,484$) to support the procurement lead time data analysis.

Table 19. Relative Frequency Distribution of x≤5

x	*f*	*f/n*
0	2,168	.038
1	993	.018
2	755	.013
3	622	.011
4	606	.011
5	712	.013

b. Statistical Analysis

We used Microsoft Excel to conduct the statistical analysis, which enabled an analysis of the entire population (N) sets rather than establishing smaller samples (n). Once the outliers were eliminated, we were able to begin the statistical analysis for each population set. The first steps were to calculate the population sizes (N), population means (μ), and population variances (σ^2) for each population set which are provided in Table 20.

Table 20. Raw Statistics

Population Set	CSO			FAR		
	N	μ	σ^2	*N*	μ	σ^2
(i) Below SAT	7	40.143	331.837	29,153	38.115	2,285.334
(ii) Between SAT and $5M	18	106.056	9,756.275	18,719	66.441	5,978.936
(iii) Above $5M	6	189.333	25,377.889	5,612	132.596	15,012.879
(iv) Total Population	31	107.290	12,973.496	53,484	57.943	5,735.796

We note that a simple comparison of means (μ) yields that in all instances $\mu_{CSO} > \mu_{FAR}$ from which we can infer that, on average, the procurement times to make the first award for contracts less than $100M is longer when using CSO solicitations as compared to those using FAR solicitations. Even so, we have not yet determined whether the difference is significant; to achieve that objective we conduct a *t*-test analysis which enables us to test the significance of the differences in the population means (μ).

Welch's (1947) *t*-test provides a method to test two independent samples with assumed unequal variances (σ^2). As reflected in Table 20 the *N* value for each population in this analysis, as well as the σ^2 is unequal and therefore the Welch's *t*-test provides the best method of evaluation for significance. The formula for Welch's *t*-test is provided in equation 3.

$$t = \frac{\mu_{CSO} - \mu_{FAR}}{\sqrt{\frac{\sigma^2_{CSO}}{N_{CSO}} + \frac{\sigma^2_{FAR}}{N_{FAR}}}} \tag{3}$$

Adapted from Kim (2019)

Next, we must calculate the degrees of freedom (*df*), which quantifies the number of values or observations (*x*) that are free to vary within a given population (*N*). The Satterthwaite (1946) formula for *df* provides for a more complete estimate of *df* that accounts for nonequal variances. The use of Satterthwaite's *df* formula reduces the variance constraints of the *t*-test and provides for greater reliability in the ability to test hypotheses for large populations as compared to other *df* models. The formula for Satterthwaite's *df* is provided in equation 4.

$$df = \frac{\left(\frac{\sigma^2_{CSO}}{N_{CSO}} + \frac{\sigma^2_{FAR}}{N_{FAR}}\right)^2}{\frac{1}{N_{cso}-1} \times \left(\frac{\sigma^2_{CSO}}{N_{CSO}}\right)^2 + \frac{1}{N_{FAR}-1} \times \left(\frac{\sigma^2_{FAR}}{N_{FAR}}\right)^2} \tag{4}$$

Adapted from Kim (2019)

As H_1 posits that $\mu_{CSO} \neq \mu_{FAR}$ (see equation 2), a two-tailed test with the established CI=.90 is used to determine the *t*-critical value for each population set. Using the Welch *t*-test, Satterthwaite *df*, and CI=.90 we can test the *t*-value for each population set against the *t*-critical values to test the hypotheses. The results of this analysis are provided in Table 21.

Table 21. Statistical Results

Population Set	***df***	***t***	***t*-critical[a]**
(i) Below SAT	6.020	.294	1.942
(ii) Between SAT and $5M	17.020	1.701	1.739
(iii) Above $5M	5.006	.872	2.015
(iv) Total Population	30.015	2.412	1.697

[a]Retrieved from statkat.com, (Online calculator, n.d.)

c. *Results and Inferences*

As a result of the analysis, the data suggests that no significant difference exists between the mean procurement lead times of contracts awarded from a CSO and those using a FAR-based solicitation for population sets i, ii, and iii individually. As such we fail to reject the H_0 for individual populations i, ii, and iii, and make the following inferences:

1. For contracts below the SAT, the mean procurement lead time of contracts awarded from CSOs ($\mu_{CSO(i)}$) is not significantly different from the mean procurement lead time of contracts awarded using FAR-based methodologies ($\mu_{FAR(i)}$). As such we fail to reject $H_{0(i)}$: $\mu_{CSO(i)} = \mu_{FAR(i)}$
2. For contracts between the SAT and \$5M, the mean procurement lead time of contracts awarded from CSOs ($\mu_{CSO(ii)}$) is not significantly different from the mean procurement lead time of contracts awarded using FAR-based methodologies ($\mu_{FAR(ii)}$). As such we fail to reject $H_{0(ii)}$: $\mu_{CSO(ii)} = \mu_{FAR(ii)}$
3. For contracts above \$5M, the mean procurement lead time of contracts awarded from CSOs ($\mu_{CSO(iii)}$) is not significantly different from the mean procurement lead time of contracts awarded using FAR-based methodologies ($\mu_{FAR(iii)}$). As such we fail to reject $H_{0(iii)}$: $\mu_{CSO(iii)} = \mu_{FAR(iii)}$

Taken individually, the data would seem to suggest that no statistical difference exists between the procurement lead times of using CSOs and FAR-based solicitations; however, the results of population set iv yields different results. Upon analyzing the entirety of all actions captured in the dataset, we find that the difference between the mean procurement lead times of contract awarded from a CSO ($\mu_{CSO(iv)}$) and those using a FAR-based solicitation ($\mu_{FAR(iv)}$) is significant, with t=2.412 as compared to the t-critical value of 1.697. This yields the rejection of $H_{0(iv)}$: $\mu_{CSO(iv)} = \mu_{FAR(iv)}$ and supports the alternate hypothesis $H_{1(iv)}$: $\mu_{CSO(iv)} \neq \mu_{FAR(iv)}$. Considering this, in conjunction with the $\mu_{CSO(iv)}$=107.290 as compared to the $\mu_{FAR(iv)}$=57.943, the data suggests that the procurement lead time for contracts awarded from a CSO is significantly longer than those using FAR-based methodologies.

d. Other Observations

In addition to the statistical analysis captured in this part of the research, the data enabled us to quantify the total CSO utilization by military department. For FYs 2020 through 2022, the FPDS data reflects there were a total of 62 contract awards executed pursuant to the CSO solicitation process for the Departments of the Air Force, Army, and Navy, with the USAF reporting the most CSO-based awards of the three military departments. These trends show adoption of the CSO process over time and give insight into the authority's utilization across the military departments. Figure 6 provides a graphical representation of this CSO utilization for the period.

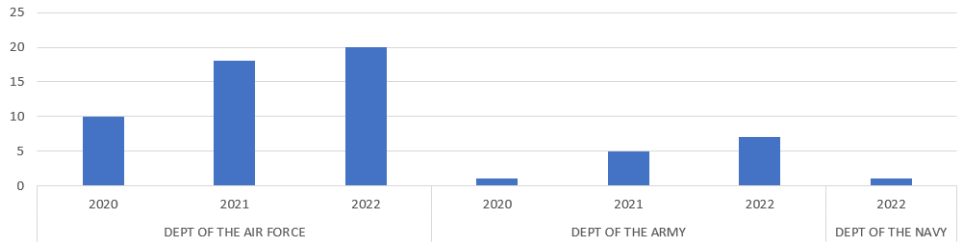

Figure 6. Total CSO utilization by Military Department, FYs 2020–2022.

Considering the total quantity of USAF contract awards made from CSOs reflected in Figure 6 in comparison to the findings discussed in Table 14 and as reported by GAO (2022b) protest report, it is evident that the data in FPDS does not adequately capture the totality of efforts awarded from the CSO solicitation process. From FYs 2020 to 2022, the USAF reported 48 individual awards made from CSOs in the FPDS, by comparison GAO (2022b) identified 46 individual projects that were made from a single CSO. It is unknown whether these funded projects resulted in contracts, OTs, a combination of the two, or some other agreement, or whether they were exempt from FPDS reporting. Regardless, this disparity in the data shows that additional processes are needed to fully understand the DOD's CSO utilization and draw further conclusions.

C. IMPLICATIONS OF FINDINGS

Most of the listed CSO Cross Talk comments were categorized as best practices since the agency representatives primarily framed their feedback as subjective recommendations to other agencies. Objective strengths and weaknesses may have been few in number as a result of the noted lack of accurate CSO data reporting in Table 5. It is possible to infer that some of the best practices could be due to a strength being the flexibility of the CSO solicitation technique. Alternatively, a weakness being ambiguity or confusion could also be inferred when considering the extensive best practices, with the majority regarding Internal Agency Processes, being recommended to ensure efficiency and successful contracts which may otherwise not be achieved. The most comments being categorized under Internal Agency Processes is also notable in the types of recommendations that the acquisition community feels are needed and will be well-received and utilized. Finally, it is noted that a few of the observations are duplicative, but they were all left in to highlight how multiple agencies made similar comments as that could influence prioritization of recommendations at the end of this chapter. Expanding beyond just the limited number of strengths and weaknesses identified in the CSO Cross Talks feedback, the other findings discussed in this chapter capture that there are overall many more strengths than weaknesses regarding CSOs at this point.

In total, we made 66 individual observations of strengths, weaknesses, and best practices. Within those observations we identified 27 strengths, seven weaknesses, and 43 best practices in the documented findings of the CSO data. Some of these observations were assigned to multiple categories or were defined as both a best practice and a strength or a weakness. These findings were also categorized across ten categories according to their central theme(s), with some findings falling into multiple categories. The total quantities of strengths and weaknesses by category are provided in Table 22. The protest findings, especially, are a very telling representation of the significant advantage that CSOs may have over FAR-based solicitation techniques in that so few protests have been filed, and none have been sustained that were filed on the basis of the CSO process itself. Additionally, the process flexibility and limited scope of litigation that comes from judicial

deference are strengths that merit prudent planning and potential opportunities which contracting activities can embrace in their own solicitation planning process.

Table 22. Quantity of Strengths and Weaknesses by Category

Category	Strengths	Weaknesses
Training and Information Sharing	1	1
Internal Agency Processes	2	4
Solicitation Definition	2	0
Industry Interaction	1	0
Expanded Solution Horizons	4	0
Industry Participation and Competition	3	0
Cost/Price/Budgeting	1	1
Schedule and Planning	1	1
Process Flexibility	7	0
Scope of Litigation	5	0

Considering the procurement lead time data analysis conducted in this chapter, one might surmise that the CSO solicitation process is wholly inefficient at expediting the time to contract award; however, this analysis is a singular facet of the total research and is constrained by factors which preclude definitive decision making regarding the procurement lead time. Regardless, the procurement lead time analysis does not support that CSOs are an expedited acquisition technique. As discussed in Chapters I and III, the analysis of procurement lead time discussed in this chapter is constrained by the quality and quantity of the available data. For this research, we performed a statistical analysis of the CSO procurement lead time by quantifying the days that elapsed from the CSO issue date to the earliest date of contract award made from the CSO. This analysis relied on the data input to FPDS by contracting activities reporting contract awards. While this research

recognizes that some CSO models allow for initial responses to be received many days or even months after the CSO is issued, the data available in FPDS does not provide for a means to identify the elapsed time between CSO responses and contract award. Furthermore, the solicitation date is manually entered into the system by the contracting activity, leaving room for user error and misreporting. These factors exemplify the quality and quantity constraints identified in this research and do not provide for an infallible method of testing the CSO process as compared to the FAR solicitation techniques. Even so, our procurement lead time analysis provides for a foundational baseline and analytical model against which future analysis may be conducted, once more reliable data can be obtained through implementing the recommendations discussed in the next section. With improved data quality and reliability, the model we established in this research will facilitate a more robust and reliable comparison of the CSO process and FAR solicitation techniques, allowing for validation, verification, and representative quantification of the strengths and weaknesses identified in this research.

Given the totality of the research we have conducted, we believe that the CSO process should be embraced by agencies seeking to expand their technological horizons and capabilities. The strengths we identified in this research greatly outweigh the weaknesses. Using the best practices and observations we have noted in our research, agencies can equip themselves with the best means and processes to execute successful CSO solicitations. From the data, we find that the CSO solicitation technique also has applications beyond the R&D arenas and can be used to identify innovative means to accomplish operations, sustainment, and even maintenance tasks, potentially providing total life cycle cost savings to the government as a result. As discussed throughout this research, we also note that the CSO process and procedure is relatively immature and rapidly evolving as compared to other solicitation methodologies. In an effort to ensure the continued success of the CSO as a solicitation technique to achieve innovation we provide targeted recommendations in the areas of training and development, policy changes, tracking and reporting, which is contained in the next section of this research.

D. RECOMMENDATIONS

This section presents focused recommendations based on the results of the analysis found in this research. In total we provide eight recommendations, each with their anticipated benefits and methods to implement. The recommendations encompass three categories: training and development, policy changes, and tracking and reporting.

1. Federal Procurement Data System Modification

The first recommendation involves both a policy and tracking and reporting change. We perceive this recommendation to be the simplest to implement. As discussed in Chapter III, FPDS data is collected through contract action reporting. This reporting is completed by individual contracting activities completing a form in the system which provides data about the contract(s) reported. To meet the government's reporting needs and requirements of the time, these form fields are often updated and changed, and new fields are added as necessary. This includes the addition of new data elements, new reporting options, and temporary instructions through special coding in the description field. These changes are executed by a team of support contractors.

We propose a two-part modification to the FPDS contract action report. The first modification is to include Solicitation Technique as a reporting criterion. This field would capture the solicitation technique used to acquire the contract award being reported and should include a drop-down selection for CSO as well as ones for other solicitation techniques such as request for proposal, request for quote, BAA, invitation for bid, and others. With the addition of the Solicitation Technique reporting criterion, the government and future researchers will be able to analyze specifics about solicitation methodologies and the contract awards that follow in a manner similar to the analysis we conducted in this research. The inclusion of the Solicitation Technique reporting criterion will also allow for the analysis of other areas that extend beyond the scope of our research, such as industry involvement across differing solicitation techniques, cost/price history and modification metrics, small business participation across solicitation techniques, and targeted areas to bolster training in solicitation techniques. Absent a dedicated field to report solicitation technique, we recommend the government modifies the action description field to enable

reporting of the solicitation technique, which would still present opportunities for future reporting, analysis, and informed decision making.

The second modification to the FPDS contract action report we recommend is the inclusion of Initial Proposal Receipt Date as a reporting criterion. This new field should be a date-field which reports the date the initial proposal was received for all new awards being reported into the FPDS. The FPDS contract action report currently includes a field to report the solicitation date; however, this is not necessarily a useful data point for general solicitations which can be open for long periods of time and which can invite multiple proposals during its open period(s). Absent this modification to the FPDS, there is no discernable means to distinguish the procurement lead times between a contract action where the proposal was received one day after the CSO was issued, and a contract action where the proposal was received one year after the CSO was issued. The addition of proposal receipt reporting will enable future analysis of procurement lead time for both contracts awarded from CSO solicitations, and those awarded by other means.

2. Expand Contract Type Options

The next policy change recommendation involves a more material revision to the CSO authority by expanding the available contract types for awards to include time-and-materials or labor-hour. As noted in the literature review regarding commercial products and services, the FASA of 1994 initially instructed commercial items only be procured used fixed-price contract types, which is similar to the current CSO limitations (Tenaglia, 2022). However, there was an eventual expansion of contract type options to time-and-materials or labor-hour under certain circumstances, most notably when it is "not possible at the time of placing the contract or order to accurately estimate the extent or duration of the work or to anticipate costs with any reasonable degree of confidence" (FAR 12.2). Since CSOs are soliciting innovative solutions, it is reasonable to assume that offerors may not always be able to precisely estimate the work required to achieve their potentially groundbreaking goal. It would be doing a disservice to the government to lose the possibility of awarding a contract for that product, technology, or service because the offeror did not want to submit a fixed-price proposal and risk its profit potential if it took

more effort or resources to complete the contract objectives than the offeror had proposed. This recommendation could be considered by Congress to expand the language of Section 803 of the FY 2022 NDAA (2022) to include provisions of expanded contract types in awards from CSOs. The Office of Defense Pricing and Contracting could then issue a follow-on class deviation recognizing the expanded authority. While this research only considered data and literature available as of January 31, 2023, it is noted that on that day, DOD proposed amendments to the DFARS to add the preponderance of Class Deviation 2022-O0007 into DFARS part 212, with public comments due April 3, 2023 (Defense Federal Acquisition Regulation Supplement: Defense Commercial Solutions Opening, 2023). If it is incorporated into the DFARS sometime later, this policy change would have to be implemented by a similar DFARS proposed rule or the follow-on class deviation discussed in this recommendation.

3. Formal Training through the Defense Acquisition University

For the first training and development recommendation, we recommend the DAU develop and offer a standalone training course on CSOs. It should begin with comparing the differences from FAR-based solicitation techniques and identifying the particular processes and/or documentation that it bypasses for the special purpose of streamlining contract awards for innovative solutions, similar to how we have conducted our research. Our research and findings can even be used as a starting point to develop the course material, or our research could be included in its entirety to facilitate critical thinking and analysis through the DAU course. Since there are so many different uses under the CSO authority's definition of "innovative," it would be prudent for more contracting officers to have the opportunity to learn about the authority and its opportunities, add it to their contracting toolbox, and champion for its implementation when possible and appropriate at their individual agencies. The course can also provide its students with solicitation and evaluation templates and plain language documentation to use as a resource. As highlighted often in the CSO Cross Talks, while CSO flexibility is appreciated, there is great value in standardization and uniformity for repeatable processes. As a future evolution of this training and development recommendation, the DAU, or some other activity, could develop a comparative tool which includes decision logic to guide future procurement

teams through a methodical decision process of choosing the most advantageous solicitation technique for their requirement(s), whether that be a CSO or some other solicitation technique.

4. Establish Commercial Solutions Opening Center of Excellence

The next training and development recommendation establishes the next evolution of an ongoing initiative. Since the USAF has currently awarded the most contracts from CSOs as reflected in Figure 6, and the USAF (2022) has established their TTP discussed in Chapter II, we recommend the USAF take the DOD lead in consolidating CSO DOD guidance documents, best practices, and procedures in furtherance of the DOD's knowledge management (KM) environment. These resources could be documented and catalogued through a virtual site with appropriate access controls, perhaps as a resource open to all DOD access card holders under the USAF Innovation Toolbox (USAF, n.d.). A similar website after which to model itself could be the "Acquisition Innovation" site created and maintained by the Defense Advanced Research Projects Agency, which features history, training, samples, and other resources for the acquisition of innovative technology using the award of OTs (Defense Advanced Research Projects Agency, n.d.). In doing so, the USAF can establish themselves as the DOD's "CSO Center of Excellence." While this could be seen as duplicative of the DAU course, it would be a more fluid resource and able to stay current with best practices regularly being discovered and shared as more CSOs are being utilized. Furthermore, the CSO Cross Talks should be continued for which policy advisors and experienced practitioners can still directly contribute, but their resultant summary bulletins and other guides, samples, etc. can be shared for any DOD acquisition personnel on the recommended virtual site.

5. Address Resource Strain through Organizational Structuring

Beyond the individual contracting officer training and development, a key recommendation is for senior contracting officials to recognize the resource strain that may result in the use of CSOs, and to develop organizational structures accordingly. While the CSO is touted as an easy and streamlined process, it has been anecdotally proven in the CSO Cross Talks and the authors' own observations to become administratively

cumbersome to manage when there is a high likelihood of strong interest from industry to submit proposals. Depending on the agency's structure, separate CSO divisions and additional personnel may be necessary to ensure the potential efficiencies can be maximized. Contracting offices must also ensure they achieve buy-in from their agency's technical SMEs and all necessary agency stakeholders, such as IT, cyber security, and logistics, to facilitate prompt proposal review, operational feasibility, and close collaboration with the contracting officer(s) to draft successful contracts.

6. Publication of Requirements and Industry Involvement

Another recommendation is regarding industry engagement as numerous findings point to the need for creative means to interact with potential offerors. To successfully reach the often-nontraditional companies that may otherwise be intimidated or discouraged by FAR-based solicitation techniques, DOD agencies need to make particular effort to advertise their CSOs beyond the GPE. Links to the CSO posted on LinkedIn or industry-specific websites would be helpful. Beyond that, technical SMEs or contracting personnel could attend industry conferences to have one-on-one networking opportunities with the types of companies they think could have government-applicable innovative ideas. This recommendation can be categorized under training and development as it deviates from traditional solicitation publication methods, and the acquisition workforce will need education on the value of taking these extra steps beyond the usual process. As discussed in Chapter II, the posting of the CSO mimics a combination of market research techniques and the solicitation; embracing this recommendation takes advantage of this opportunity for efficiency and evolves it through combining additional pre-award elements of information sharing (FAR 5.1), leading to further opportunities for efficiency.

7. Improve Reporting of Negotiation Documentation to Capitalize on the Department's System of Systems

Our penultimate recommendation addresses a final policy, tracking, and reporting change. When conducting negotiations of noncompetitive contract actions valued above $25 million, contracting officers are required to upload approved negotiation documents, such as price negotiation memorandums, into the Contract Business Analysis Repository

(CBAR) tool in the government's Procurement Integrated Enterprise Environment (PIEE) suite of applications (DFARS PGI 215.4). The results of the negotiations are then made available to other contracting personnel to prepare for future negotiations. Furthermore, when uploading the negotiation documents, users are required to enter basic information about the agency, contractor, contract, and negotiation process. Unfortunately, to retrieve details about the negotiation and reasonableness determination process(es), users must scour the tool, download, and read through negotiation documents individually to understand the negotiation history. As part of the PIEE suite, the CBAR tool connects to the Electronic Document Access application, which provides for post-award administrative reporting. CBAR could also connect to other applications and tools within the PIEE to form a system of systems and enable robust reporting and business analytics.

Considering CBAR's utility as a tool to assist future negotiations, and in acknowledgement of the CSO process which is considered competitive, we first recommend a policy change which expands the mandatory reporting requirement and upload of cost/price negotiation documents for all contract actions valued above $25 million regardless of the competitive nature of the requirement. The requirement to determine a price fair and reasonable is universal and does not distinguish between whether the action is competitive or noncompetitive. Our recommendation recognizes that when negotiations occur, FAR 15.406-3 requires that those negotiations be documented in some form. CSOs are not exempt from this documentation requirement when the contracting officer engages in negotiations. This change will provide additional resources to contracting officers in developing future negotiation objectives for both CSOs and those using FAR-based techniques by expanding the pool of available resources useful for preparing for and establishing negotiation objectives.

Expanding the reporting requirements does not, in itself, address the accessibility flaw of the CBAR tool. Acknowledging the scalability of the PIEE suite, we further recommend the CBAR tool be modified to include a field which requires solicitation and evaluation methodology when uploading a negotiation document. Including this field will enable a more streamlined method to conduct reviews and analyses of how fair and reasonable pricing is achieved for both CSOs and all other reportable contract actions.

Furthermore, even for contracts that do not exceed the minimum reporting threshold established in the DFARS PGI, DOD should consider requiring reporting of the process(es) used to determine fair and reasonable pricing, especially for commercial acquisitions, including those that used the CSO solicitation technique. This requirement will provide an array of valuable data, bolstering the negotiating process and lessening the narrow reliance on business acumen to determine price reasonableness. Scaling the CBAR tool could then lead to further applications to support negotiations, such as connection points with the USAF's weighted guidelines online tool and others, but those applications are beyond the scope of this research and its recommendations.

8. Caution Against Wide-Sweeping Changes in Policy

As a final recommendation, we recommend constraining future policy regarding the CSO solicitation technique to only that necessary to execute legal contracts and agreements. As reflected in this research, innovation requires flexibility and freedom to engage in continuous improvements and limit imitation. In order to maintain the flexibility of CSOs, future policy should avoid unnecessary restrictions in the CSO process. Rather than policy which constrains or restricts the CSO solicitation process, the government should instead invest in its KM environment and bolster the government workforce's knowledge and understanding of CSOs to facilitate further innovation in the procurement process. Doing so will equip the DOD workforce with the "best weapons with which to compete . . . knowledge and service" (p.132) as discussed by Johannessen et al. (1999) and this research. This will lead to increased learning capacity of the DOD's knowledge workers and secure a competitive advantage of defense superiority. The CSO process and this recommendation, taken collectively with our other recommendations, will facilitate the DOD securing this competitive advantage through KM.

E. SUMMARY

This chapter presented the results, analysis, and findings of our research and captured a total of 66 individual observations, 27 strengths, seven weaknesses, and 43 best practices falling across 11 categories from the documented findings of the CSO process. The research captured the collective of these strengths, weaknesses, and best practices of

CSOs as a solicitation technique and provided methods the DOD can implement to bolster its KM environment. This chapter also provided an analysis of procurement lead times from the available data and provided a statistical comparison of the procurement lead times of contracts awarded using the CSO solicitation technique, and those awarded using FAR based solicitations, providing a foundational baseline and analytical model against which future analysis may be conducted. Following the analysis, we discussed the implications of our findings and what inferences and conclusions we could make as a result of our findings. Finally, we provided recommendations for policy changes, training and development, and tracking and reporting. The following and final chapter completes this research by providing an overall summary, conclusion, and recommendations for areas of future research.

V. SUMMARY, CONCLUSION, AND AREAS FOR FURTHER RESEARCH

A. INTRODUCTION

This chapter provides a summary of the research and resulting conclusions drawn as a result of our findings. Through its conclusion section, this chapter recalls the four primary research questions and draws upon our findings and observations to answer those questions. This chapter closes with recommendations for further research regarding the CSO solicitation process and the awards and transactions that are issued pursuant to the CSO process.

B. SUMMARY

This research established that the traditional FAR-based solicitation and award techniques are considered "inflexible" (Section 809 Panel, 2018, p.6), "inefficient" (DoDIG, 2015, p. 10), and "slow" (DoDIG, 2022, p. 7). This research also recognized that these traditional models are bureaucratic and result in delays in fielding innovations as discussed by Congress and oversight committees (GAO, 2019a). Considering these concerns, this research explored the CSO solicitation technique and the contract awards issued as a result to capture the collective strengths, weaknesses, and best practices of the CSOs to enable the aggregation of lessons learned and bolster the DOD's KM environment, leading to further proliferation of our findings and observations in the acquisition of innovative solutions. As a result, we provided recommendations in the areas of training and development, policy, and tracking and reporting to bolster the data and process value streams for the DOD's executive decision makers and practitioners.

This research was catalyzed through the foundational theories of innovation, with a primary focus on innovation theory in KM environments before exploring innovation through other paradigms. The research recognized that CSOs present opportunities for the DOD to make critical investments in technology and capability by applying innovation theory in the development of its KM environment. Through this understanding, we recognized that the adoption of the CSO as a permanent authority to solicit solutions was

an act of innovation, one that could frame future adoption of processes and authorities to achieve greater innovation as the CSO process matures.

The primary purpose of our research was to identify the strengths, weaknesses, and best practices of the CSO as a solicitation technique leading to a contract award. In recognition of that purpose, our research intended to provide the DOD and its workforce with a consolidated report analyzing available data on the CSO solicitation technique and making recommendations based on the use of CSOs. As a result of our research, we achieved that purpose and the research's intent and provided a consolidated and analysis of the available data through the exploration of the available data from published reports, the CSO Cross Talks, and an analysis of procurement lead time data from the FPDS. Furthermore, we provided eight targeted recommendations, each with their anticipated benefits and means to implement, encompassing the three themes of training and development, policy changes, and tracking and reporting.

C. CONCLUSION

The goal of this research was to answer four research questions. The questions were intended to explore the flexibility and opportunities of CSOs as a solicitation technique to acquire innovative solutions. This information could then be used to frame DOD agencies' utilization of the CSOs to support their individual missions. While not definitively answered due to limitations in the research, the following conclusions to the research questions have been made based on our findings:

1. What Are CSOs' Strengths as a Solicitation Technique?

Through this research, we identified 27 strengths of the CSO process. These fell across ten distinct categories of training and information sharing: number of findings (1), internal agency processes (2), solicitation definition (2), industry interaction (1), expanded solution horizons (4), industry participation and competition (3), cost/price/budgeting (1), schedule and planning (1), process flexibility (7), and scope of litigation (5), with some strengths assigned to multiple categories. The most telling and compelling strengths were identified in the GAO and COFC protest findings, namely that CSOs may have a significant protest-risk advantage over FAR-based solicitation techniques as there have been zero

sustained protests which challenged the CSO process itself. Additionally, the judicial deference provided to the CSO process by GAO and COFC appreciably enhance the protest-risk advantage of using CSOs to acquire innovation.

2. What Are CSOs' Weaknesses as a Solicitation Technique?

Through this research, we identified seven weaknesses of the CSO process. These fell across four distinct categories of training and information sharing: number of findings (1), internal agency processes (4), cost/price/budgeting (1), schedule and planning (1). Though few in number compared to the total strengths, the CSO weaknesses point to the need to engage in prudent planning and develop sound processes when planning a CSO solicitation. Particularly, we find the absence of weaknesses identified in the GAO and COFC protest decisions to be noteworthy.

3. What Are Best Practices for Utilizing the CSO Solicitation Process?

Through this research, we identified 43 individual best practices for implementing the CSO process. These best practices involved the planning process, the soliciting process, and the evaluation process and we recommend adoption of the entire catalogue of best practices when planning future CSO solicitations. Of particular note are the best practices regarding internal agency processes as this category had the most robust list of recommendations from early CSO users. As CSOs become a more popular solicitation technique for both the government to use and industry to respond to, agencies will need to recognize the importance of properly scaling up in their preparation of the planning, soliciting, and evaluation processes surrounding it.

4. What Is the Statistical Difference, if any, in the Procurement Lead Times of Contracts Awarded from a CSO and Those Awarded from a FAR-based Solicitation, and What Inferences Can be Made of This Difference?

Taken individually, the procurement lead time data analysis suggests that no significant difference exists between the procurement lead times of contracts awarded from a CSO and those using a FAR-based solicitation when examining them in three distinct groups of (1) less than the SAT, (2) SAT to less than $5M, and (3) $5M to $100M.

Considering the data as a collective of all actions less than $100M, however, the analysis found that a statistical difference does exist in the procurement lead times of contracts awarded from a CSO and those using FAR-based solicitations. This finding, in conjunction with the finding that the mean procurement lead time of contracts awarded from a CSO is longer than the mean procurement lead time of those contracts awarded using a FAR-based solicitation, suggests that the procurement lead time for contracts awarded from a CSO is significantly longer than those using FAR based methodologies when considering the totality of all actions less than $100M.

Considering these findings, one might surmise that the CSO process is wholly inefficient at expediting the time to contract award; however, this analysis is a singular facet of the total research and is constrained by factors which preclude informed decision making regarding the procurement lead time. As discussed in Chapters I and III, our statistical analysis of procurement lead time is constrained by the quality and quantity of the available data. Due to these constraints, we were unable to make reliable, informed inferences about the procurement lead times; however, we postulate that our analysis provides for a foundational baseline and analytical model against which future analysis may be conducted, once more reliable data can be obtained through implementing our recommendations contained in this research. With improved data quality and reliability, the model we established in this research will facilitate a more robust and reliable comparison of the CSO process and FAR solicitation techniques, allowing for validation, verification, and representative quantification of the strengths and weaknesses identified in the research.

D. AREAS FOR FURTHER RESEARCH

In his research, Lynn (2018) discussed the five stages model as developed by Rogers in 1995 for supporting the adoption of innovation within organizations. Within the research, Lynn summarizes Rogers's five stages of innovation adopting as "[1] agenda setting, [2] matching, [3] restructuring [and] redefining, [4] clarifying, and [5] routinizing" (p. 15); Lynn then applies the model to the integration of OTs within DOD organizations. Through the analysis and applying the Rogers model, Lynn clarifies the adoption of OTs

within the acquisition community. This model could be useful as a methodology to analyze CSOs. Future research could combine the results of our research with an analysis of the adoption of CSOs throughout the DOD acquisition community using either the Rogers model or some other methodology. We anticipate the combining of our research and an analysis through the Rogers's five stages model could be beneficial to better understand the integration of CSOs within DOD organizations.

Another avenue of future research is the further dissection of contract data into individual commands to support an exploration of what, if any, unique processes or approaches those commands employ that led to efficiencies. Through that exploration the acquisition community can glean lessons learned and develop a more robust set of guidance and procedures to fully maximize the efficiencies of using the CSO solicitation methodology. This research could then bolster our proposed CSO Center of Excellence discussed in Chapter IV Recommendations.

Next, as a single CSO can result in the award of multiple contracts and OTs, future research could compare the procurement lead time, efficiencies, and opportunities of using a single CSO that results in multiple awards to individual awards made using other means. This could be executed by adopting our procurement lead time data analysis as the foundational baseline and maturing the analytical process model to include a means to calculate a weighted average of procurement lead times considering the multiple award construct. We caution, however, that without the application of at least some of the recommendations we provided in our research, any such analysis may lead to inconclusive results.

Recalling our CSO Cross Talk findings that noted a lack of accurate CSO data reporting, coupled with our finding that FPDS data does not adequately capture the totality of efforts awarded from the CSO solicitation process, the adoption of our recommendations in Chapter IV are critical to supporting future research. With the implementation of our recommendations, future research can be conducted to further understand the DOD's CSO utilization and draw further conclusions about the strengths, weaknesses, and best practices of CSOs as a solicitation technique.

Further research is also needed to fully understand the significance of the differences in procurement lead time. Through our analysis, we found that our data suggests that the procurement lead time for contracts awarded from a CSO is significantly longer than those using FAR-based methodologies; however, we also recognize that the analysis is constrained by factors which preclude definitive decision making regarding the procurement lead time. While the current constructs of data reporting and analysis preempted us from definitive conclusions, we believe the implementation of our FPDS Modification recommendation in Chapter IV of this research will improve and expand upon the available data for analysis. With this new data available, future researchers can use our procurement lead time data analysis as an analytical model to retest the significance in the difference of procurement lead times between contracts awarded from CSOs and those using FAR-based methodologies. Furthermore, the implementation of Formal Training through the DAU and establishment of a CSO Center of Excellence from Chapter IV Recommendations will improve the quality limitation of our research, further enabling definitive decision making from future research and analysis.

This research focused on CSOs resulting in award of FAR-based contracts; however, there is no prohibition of awarding an OT from a CSO as long as it is fixed-price. In fact, the language of Section 803 of the FY 2022 NDAA (2022) specifically authorizes the CSO process for both "contracts and agreements" (p. 274). Accordingly, future research could be conducted using the methods we established in our research to analyze strengths, weaknesses, and best practices as they particularly apply to CSOs resulting in OTs.

Finally, since a motivator for the government to use CSOs is to remain competitive for the best ideas and solutions available from private industry, further research on industry engagement with CSOs as compared to FAR-based competitive solicitations could be valuable. While best practices of industry interaction were discussed in our findings, direct feedback from companies of CSOs' strengths, weaknesses, and best practices from their perspective would be helpful to prevent the loss of innovative solutions to private industry exclusivity or foreign adversaries.

E. CALL TO ACTION

In summary, CSOs provide an opportunity for the DOD to capitalize on the innovative capabilities and advances of industry, propelling the DOD to expanded solutions horizons, improving industry participation and competition, providing process flexibility, and securing against protest risk. As a solicitation technique, the CSO is a valuable tool to achieve innovation, but prudent planning and application of this research's identified best practices are critical to ensure acquisition success. Furthermore, by implementing the recommendations provided in this research, the DOD will be postured to utilize the CSO solicitation technique to its fullest potential, closing the technological capability gap and providing for better defense capabilities to the nation.

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APPENDIX A. DOD CLASS DEVIATION 2022-O0007 "DEFENSE COMMERCIAL SOLUTIONS OPENING

OFFICE OF THE UNDER SECRETARY OF DEFENSE
3000 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000

ACQUISITION
AND SUSTAINMENT

In reply refer to
DARS Tracking Number: 2022-O0007

MEMORANDUM FOR COMMANDER, UNITED STATES CYBER
COMMAND (ATTN: ACQUISITION EXECUTIVE)
COMMANDER, UNITED STATES SPECIAL OPERATIONS
COMMAND (ATTN: ACQUISITION EXECUTIVE)
COMMANDER, UNITED STATES TRANSPORTATION
COMMAND (ATTN: ACQUISITION EXECUTIVE)
DEPUTY ASSISTANT SECRETARY OF THE ARMY
(PROCUREMENT)
DEPUTY ASSISTANT SECRETARY OF THE NAVY
(PROCUREMENT)
DEPUTY ASSISTANT SECRETARY OF THE AIR FORCE
(CONTRACTING)
DEFENSE AGENCY AND DOD FIELD ACTIVITY DIRECTORS

SUBJECT: Class Deviation–Defense Commercial Solutions Opening

Effective immediately, this class deviation rescinds and supersedes Class Deviation 2018-O0016 issued on June 26, 2018. Contracting officers may acquire innovative commercial products, technologies, or services using a general solicitation, called a commercial solutions opening (CSO), and the procedures provided in this class deviation. If existing CSOs contain references to Class Deviation 2018-O0016, contracting officers shall amend the CSOs as described in the next paragraph.

Use of a CSO is permanently authorized by section 803 of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2022 (Pub. L. 117-81). Section 803 of the NDAA for FY 2022 repealed section 879 of the NDAA for FY 2017 (Pub. L. 114-328); therefore, contracting officers shall—

- Amend existing CSOs to delete references to Class Deviation 2018-O0016 and section 879 of the NDAA for FY 2017; and
- Insert a reference to Class Deviation 2022-O0007. References to section 803 of the NDAA for FY 2022 are not necessary, since it is implemented by this class deviation.

Under a CSO, DoD may competitively select proposals received in response to a general solicitation, similar to a broad agency announcement, based on a review of proposals by scientific, technological, or other subject-matter expert peers. Use of a CSO in accordance with this class deviation is considered to be a competitive procedure for the purposes of 10 U.S.C. chapter 221 and Federal Acquisition Regulation (FAR) 6.102.

Contracting officers shall treat items, technologies, and services acquired using a CSO as commercial products or commercial services. Notwithstanding the limitation in Defense Federal Acquisition Regulation Supplement (DFARS) 235.006-71, a CSO may be used to fulfill requirements for research and development, ranging from advanced component development through operational systems development. When using a CSO in acquisitions for research and development, contracting officers shall use the procedures in this class deviation in conjunction with FAR part 35.

Contracting officers may use a CSO only—

- To obtain solutions or potential capabilities that fulfill requirements, close capability gaps, or provide potential technological advancements that are new as of the date of submission of a proposal or that is a new application as of the date of submission of a proposal of a technology, process, or method existing as of such date;
- When meaningful proposals with varying technical or scientific approaches can be reasonably anticipated; and
- When the contract entered into under the program will be fixed-price, including fixed-price incentive contracts.

When using a CSO, contracting officers shall ensure the CSO—

- Describes the agency's interest, either for an individual program requirement or for broadly defined areas of interest covering the full range of the agency's requirements;
- Describes the criteria for selecting proposals, their relative importance, and the method of evaluation, including, where applicable, the potential type of data rights that may be determined necessary to meet DoD's minimum needs;
- Specifies the period of time during which proposals submitted in response to the CSO will be accepted;
- Contains instructions for the preparation and submission of proposals; and
- Uses "S" in position 9 and "C" in position 10 of the procurement instrument identifier to identify the solicitation as a CSO.

Contracting officers shall publicize a notice of availability of a CSO through the Governmentwide point of entry at least annually, and, if authorized pursuant to FAR subpart 5.5, may also publish a notice in noted scientific, technical, or engineering periodicals. Synopsis under FAR subpart 5.2 of individual contract actions under the CSO is not required. The notice published pursuant to this paragraph fulfills the synopsis requirement.

The primary evaluation factors for selecting proposals for award shall be technical, importance to agency programs, and funds availability. Price shall be considered to the extent appropriate, but at a minimum, to determine that the price is fair and reasonable.

Proposals received as a result of a CSO shall be evaluated in accordance with evaluation criteria specified therein through the review of such proposals by scientific, technological, or other

subject-matter expert peers. Written evaluation reports on individual proposals are required, but proposals need not be evaluated against each other since they are not submitted in response to a common performance work statement or statement of work.

The requirements of DFARS 215.371-2 do not apply to acquisitions of innovative items, technologies, or services under a CSO pursuant to this class deviation.

Contracting officers shall not award contracts in excess of $100 million pursuant to a CSO without a written determination from the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)) or the cognizant service acquisition executive of a military department of the efficacy of the effort to meet mission needs of DoD or the relevant military department. In order to secure USD(A&S) approval, send the written determination, along with a request for USD(A&S) review and approval, via email to the Defense Pricing and Contracting (DPC) Contract Policy Directorate (CP) at *osd.pentagon.ousd-a-s.mbx.dpc-cp@mail.mil*. Requests for approval of the written determination by the cognizant service acquisition executive shall follow military department policy and procedures.

Not later than 45 days after the award of a contract under a CSO for an amount exceeding $100 million, the USD(A&S) will notify the congressional defense committees of such award. To facilitate reporting, not later than 1 day after the award of a contract exceeding $100 million under the CSO authority, the contracting officer shall—

- Prepare a notice of award for the congressional defense committees that includes—
  - A description of the innovative commercial product, commercial service, or technology acquired;
  - A description of the requirement, capability gap, or potential technological advancement with respect to which the innovative commercial product, commercial service, or technology acquired provides a solution or a potential new capability;
  - The contract award amount; and
  - Identification of the contractor awarded the contract; and
- Submit the notice of award to USD(A&S) via the cognizant service acquisition executive of a military department for signature, if applicable.
  - In order to secure USD(A&S) signature, send the notice of award, along with a request for USD(A&S) signature, via email to DPC/CP at *osd.pentagon.ousd-a-s.mbx.dpc-cp@mail.mil*.
  - Requests for approval of a notice of award by the cognizant service acquisition executive shall follow military department policy and procedures.

Contracting officers shall ensure that contract files document the market research and rationale supporting a conclusion that the requirements of this class deviation have been satisfied.

As used in this class deviation, "innovative" means any technology, process, or method, including research and development, that is new as of the date of submission of a proposal, or any application that is new as of the date of submission of a proposal of a technology, process, or method existing as of such date.

This class deviation remains in effect until incorporated into the DFARS or until otherwise rescinded. My point of contact is Mr. Larry McLaury, DPC/CP, who may be reached at 703-697-6710.

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John M. Tenaglia
Principal Director,
Defense Pricing and Contracting

APPENDIX B. FEDERAL PROCUREMENT DATA SYSTEM SUMMARY DATA TABLES

Table 23. Raw Statistics Summary Data Table—CSO

	CSO_i	**CSO_{ii}**	**CSO_{iii}**	**CSO_{iv}**
N	7	18	6	31
σ	18.216	98.774	159.304	113.901
σ^2	331.837	9,756.275	25,377.889	12,973.496
μ	40.143	106.056	189.333	107.290
M	45	85	115	65
Mode	#N/A	#N/A	#N/A	#N/A
Skew	-0.083	1.720	0.549	1.762

Table 24. Raw Statistics Summary Data Table—FAR-Based

	FAR_i	**FAR_{ii}**	**FAR_{iii}**	**FAR_{iv}**
N	29153	18719	5612	53484
σ	47.805	77.285	122.527	75.735
σ^2	2,285.334	5,972.936	15,012.879	5,735.796
μ	38.115	66.441	132.596	57.943
M	25	45	98	34
Mode	14	7	56	14
Skew	5.039	3.643	2.249	3.900

Table 25. Raw Statistics by Military Department—FAR-Based

Navy

	FAR_i	FAR_{ii}	FAR_{iii}	FAR_{iv}
N	14,666	7,316	2,148	24,130
σ	51.997	86.959	128.451	79.695
σ2	2,703.665	7,561.781	16,499.551	6,351.252
μ	39.102	72.475	144.519	58.604
M	24	45	116.5	31.5
Mode	14	7	42	14
Min	2	2	2	2
Max	886	966	1,045	1,045

Army

	FAR_i	FAR_{ii}	FAR_{iii}	FAR_{iv}
N	9,692	8,053	2,463	20,208
σ	44.223	69.853	119.915	73.191
σ2	1,955.636	4,879.417	14,379.495	5,356.959
μ	35.603	59.226	121.227	55.453
M	25	42	83	35
Mode	14	14	48	14
Min	2	2	2	2
Max	769	895	981	981

Air Force

	FAR_i	FAR_{ii}	FAR_{iii}	FAR_{iv}
N	4,795	3,350	1,001	9,146

σ	40.648	70.070	112.926	70.144
σ2	1,652.274	4,909.743	12,752.376	4,920.122
μ	40.172	70.609	134.983	61.697
M	29	50	110	39
Mode	14	35	111	21
Min	2	2	2	2
Max	543	838	889	889

Table 26. Total CSO Use by Department

Military Department	**FY**	**Totals**
DEPT OF THE AIR FORCE		**48**
	2020	10
	2021	18
	2022	20
DEPT OF THE ARMY		**13**
	2020	1
	2021	5
	2022	7
DEPT OF THE NAVY		**1**
	2022	1
Grand Total		**62**

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