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# NASA's Engineering and Technical Services Contracts

March 26, 2019

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# Office of Inspector General

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# RESULTS IN BRIEF

## NASA's Engineering and Technical Services Contracts

March 26, 2019 IG-19-014 (A-18-009-00)

## WHY WE PERFORMED THIS REVIEW

In fiscal year 2017, NASA awarded approximately $18.3 billion in contracts, about 90 percent of which ($16.4 billion) was for services, a broadly defined category of contracts that includes research and development, engineering and technical services, operation and maintenance of laboratories and facilities, and housekeeping and landscaping. In particular, the requirements for engineering and technical services contracts that support the development of complex, low maturity technologies are often less clearly defined, complex, and require state-of-the-art machinery and highly skilled personnel. In addition, the likelihood of technical requirements changing over time can also make it more difficult to estimate costs in advance. As a result, service contracts for engineering and technical services can place the government at a greater risk of unanticipated cost increases based on how the contracts are structured, the types of contracts used, inadequately scoped or defined requirements, and limitations on competition.

In 2016, NASA conducted an assessment of its procurement processes and implemented changes to reduce duplication of goods and services purchased, lessen contract and administrative costs, decrease the time required to award a contract, and improve procurement information sharing across the Agency. In 2017, NASA initiated the Mission Support Future Architecture Program (MAP) to optimize procurement and other services by moving toward a more interdependent model that enables the Agency to share capabilities across Centers, realign budget structure, and improve procurement services through collaboration. The Headquarters Office of Procurement began MAP activities in July 2018 and is scheduled to complete the review and begin implementing follow-on recommendations by October 2019.

Past reviews by our office and the Government Accountability Office have identified significant issues with service contracts at NASA and across the government. Given these concerns, as well as the billions of dollars NASA spends annually on procuring services and the Agency's recent efforts to optimize this process, we initiated this audit to review NASA's process for acquiring contracted services. Specifically, we focused on the Agency's efforts to ensure efficiency and effectiveness when procuring engineering and technical services. To conduct this audit, we examined 12 engineering services contracts with a potential value of $4.1 billion from four NASA Centers: Goddard Space Flight Center, Kennedy Space Center, Langley Research Center, and Stennis Space Center.

## WHAT WE FOUND

Each of the four NASA Centers we reviewed has made changes to the structure of its engineering and technical services contracts—such as the type of contract pricing or the length of the period of performance—in an effort to achieve cost savings, streamline technical requirements, and lessen administrative workload. We found that Centers made these changes to contract structure based on the complexity of requirements, predictability of demand, and each Center's organizational culture. However, while recent procurement assessment efforts have focused on achieving efficiencies in the procurement process, data collection efforts related to determining whether these changes led to efficiencies were minimal. We attribute this, in part, to challenges associated with limited requirements to track such data across the Agency, which lessens the likelihood that lessons learned will be shared for future acquisitions. Although NASA has a

variety of mechanisms at the Headquarters and Center levels to share lessons learned, many of these are informal, dependent upon personal relationships between Centers, and not focused on sharing information on efficiencies. Without a methodology to capture, measure, and share such data, NASA may be missing opportunities to streamline and strengthen acquisitions while achieving savings and reducing duplicative requirements in its service contracts.

## WHAT WE RECOMMENDED

As NASA continues its efforts to assess procurement processes and optimize mission support services, in order to identify efficiencies and promote sharing of best practices related to service contract structures, we recommended NASA's Assistant Administrator for Procurement (1) develop an Agency-wide standardized set of metrics for contracts that can be collected, tracked, and analyzed over time to identify efficiencies resulting from a change in contract structure; (2) require Center Procurement Offices to formally collect, track, and report data to the Headquarters Office of Procurement on these metrics at least annually; and (3) develop a community of practice to analyze contract structure changes that lead to the greatest efficiencies and share these lessons learned with the Agency's procurement community.

We provided a draft of this report to NASA management who concurred or partially concurred with our recommendations and described actions the Agency plans to take to address them. We consider management's comments responsive; therefore, the recommendations are resolved and will be closed upon verification and completion of the proposed corrective actions.

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# TABLE OF CONTENTS

# Acronyms

| | |
|---|---|
| BSA | Business Services Assessment |
| FAR | Federal Acquisition Regulation |
| FY | fiscal year |
| GAO | Government Accountability Office |
| IDIQ | Indefinite-Delivery, Indefinite-Quantity |
| MAP | Mission Support Future Architecture Program |
| NFS | NASA FAR Supplement |
| OIG | Office of Inspector General |
| SACOM | Synergy-Achieving Consolidated Operations and Maintenance |
| SEB | Source Evaluation Board |

# INTRODUCTION

In fiscal year (FY) 2017, NASA awarded approximately $18.3 billion in contracts.[1] Of this amount, NASA spent about 90 percent ($16.4 billion) for services—a broadly defined category that includes research and development, engineering, operation and maintenance of the Agency's laboratories and facilities, and housekeeping and landscaping.

In previous reviews, we identified significant issues with NASA's contracting process, particularly its use of service contracts. Specifically, in 2016 we found that vague statements of work can lead to duplication across engineering services contracts.[2] In addition, we found that the Agency's Strategic Sourcing Program—designed to save money by more strategically acquiring common products and services—fell far short of its goals.[3] The Government Accountability Office (GAO) has reported on government-wide issues with service contracts and has identified certain contract types as risky because of the potential for cost escalation and because the government pays the contractor's costs regardless of whether work is completed.[4] Moreover, GAO has identified NASA acquisition management as a high-risk area since 1990.[5]

In 2016, NASA conducted a Business Services Assessment (BSA) to evaluate the health of its procurement processes and identify areas for improvement. As a result of the assessment, the Agency implemented changes to reduce duplication of goods and services purchased, lessen contract and administrative costs, decrease the time required to award a contract, and better share procurement information across NASA. While the assessment focused on procurement processes, many of the decisions made also affect how NASA contracts for services. Additionally, in 2017 the Agency initiated the Mission Support Future Architecture Program (MAP) to review the efficiency and effectiveness of its mission support service activities. The Headquarters Office of Procurement began MAP activities in July 2018 and is scheduled to complete the review and begin implementing the resulting recommendations by October 2019.

Given the significant amount of money NASA spends annually on procuring services and the Agency's recent efforts to optimize this process, we initiated this audit to review NASA's process for acquiring contracted services. Specifically, we focused on the Agency's efforts to ensure efficiency and effectiveness when procuring engineering and technical services. To conduct this audit, we judgmentally selected 12 engineering and technical services contracts to examine as case studies. We obtained the universe of NASA service contracts awarded in FY 2015 through FY 2017 with a potential

[1] This amount does not include intragovernmental awards or purchases less than $3,500.

[2] NASA Office of Inspector General (OIG), *Audit of NASA's Engineering Services Contract at Kennedy Space Center* (IG-16-017, May 5, 2016).

[3] NASA OIG, *NASA's Strategic Sourcing Program* (IG-14-010, January 15, 2014).

[4] GAO, *Contract Management: Extent of Federal Spending under Cost-Reimbursement Contracts Unclear and Key Controls Not Always Used* (GAO-09-921, September 30, 2009).

[5] GAO, *High Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others* (GAO-17-317, February 15, 2017).

value above $20 million, identified product and service codes that represented the acquisition of engineering and technical services, then added additional contracts from Kennedy Space Center (Kennedy) based on Center officials identifying these contracts as having a high percentage of engineering work.[6] We also added one contract awarded in FY 2014 from Langley Research Center (Langley) because of its high dollar value. In total, the 12 contracts had a potential value of $4.1 billion and were from four Centers: 4 contracts at Goddard Space Flight Center (Goddard), 4 contracts at Kennedy, 2 contracts at Langley, and 2 contracts at Stennis Space Center (Stennis). See Appendix A for details on our scope and methodology and Appendix B for a full list of our case studies.

# Background

Service contracts, as defined by the Federal Acquisition Regulation (FAR), directly engage the time and effort of a contractor whose primary purpose is to perform an identifiable task rather than to furnish an end item of supply.[7] Table 1 provides NASA's top service categories in FY 2017 by dollar amount.

**Table 1: NASA's FY 2017 Top Service Categories by Total Obligations**

| Service Type | Number of Contract Actions[a] | Total Obligations (in millions) |
|---|---|---|
| Research and Development | 17,758 | $10,415.0 |
| Professional, Administrative, and Management Support | 5,130 | $2,087.2 |
| Transportation, Travel, and Relocation Services[b] | 295 | $1,546.6 |
| Information Technology and Communications | 2,498 | $870.7 |
| Operation of Structures/Facilities | 350 | $385.8 |
| Utilities and Housekeeping | 946 | $379.5 |

Source: NASA procurement data.

[a] Contract actions include new contracts or modifications to existing contracts that change the total amount of funds obligated. Not included are intragovernmental awards and purchases less than $3,500.

[b] Includes contracts for launch services.

NASA uses service contracts for a broad range of activities. For instance, the Agency has service contracts for transporting supplies, equipment, and science experiments to and from the International Space Station. NASA also uses these contracts to support the operation and maintenance of specialized facilities such as wind tunnels and research laboratories. Research and development contracts constitute the largest category of services and include research of Earth and planetary sciences and development of instruments and spacecraft. For example, one of NASA's research and development contracts is for the development of the Geostationary Carbon Cycle Observatory, a satellite that will monitor plant health and vegetation stress, and probe the natural sources and exchange processes that control carbon dioxide, carbon monoxide, and methane in the atmosphere.[8]

[6] Product and service codes are assigned to every contract in Federal Procurement Data System-Next Generation to describe the product, service, or research and development effort being procured. We identified relevant product and service codes from the General Services Administration's acquisition.gov website.

[7] FAR Subpart 37.1, "Service Contracts-General."

[8] The Geostationary Carbon Cycle Observatory was competitively selected from 15 proposals submitted to NASA's second Earth Venture Mission announcement of opportunity for small orbital investigations of the Earth system.

NASA's second largest category of service contracts is professional, administrative, and management support such as financial, human resources, and advisory services. This category also includes engineering and technical services, which frequently support the development of complex, low maturity technologies and include laboratory maintenance and support as well as development of engineering software. For instance, NASA has a contract for engineering services for the design, fabrication, and testing of guidance, navigation, and control of space flight and ground system hardware and software. Often, the requirements for these types of contracts are less clearly defined, complex, and require state-of-the-art machinery and highly skilled personnel. The likelihood of technical requirements changing over time make it difficult at times to estimate costs in advance. As a result, service contracts for engineering and technical services can place the government at a greater risk of unanticipated cost increases based on how the contracts are structured, including the types of contracts used, inadequately scoped or defined requirements, and limitations on competition.

## NASA's Acquisition Process for Services

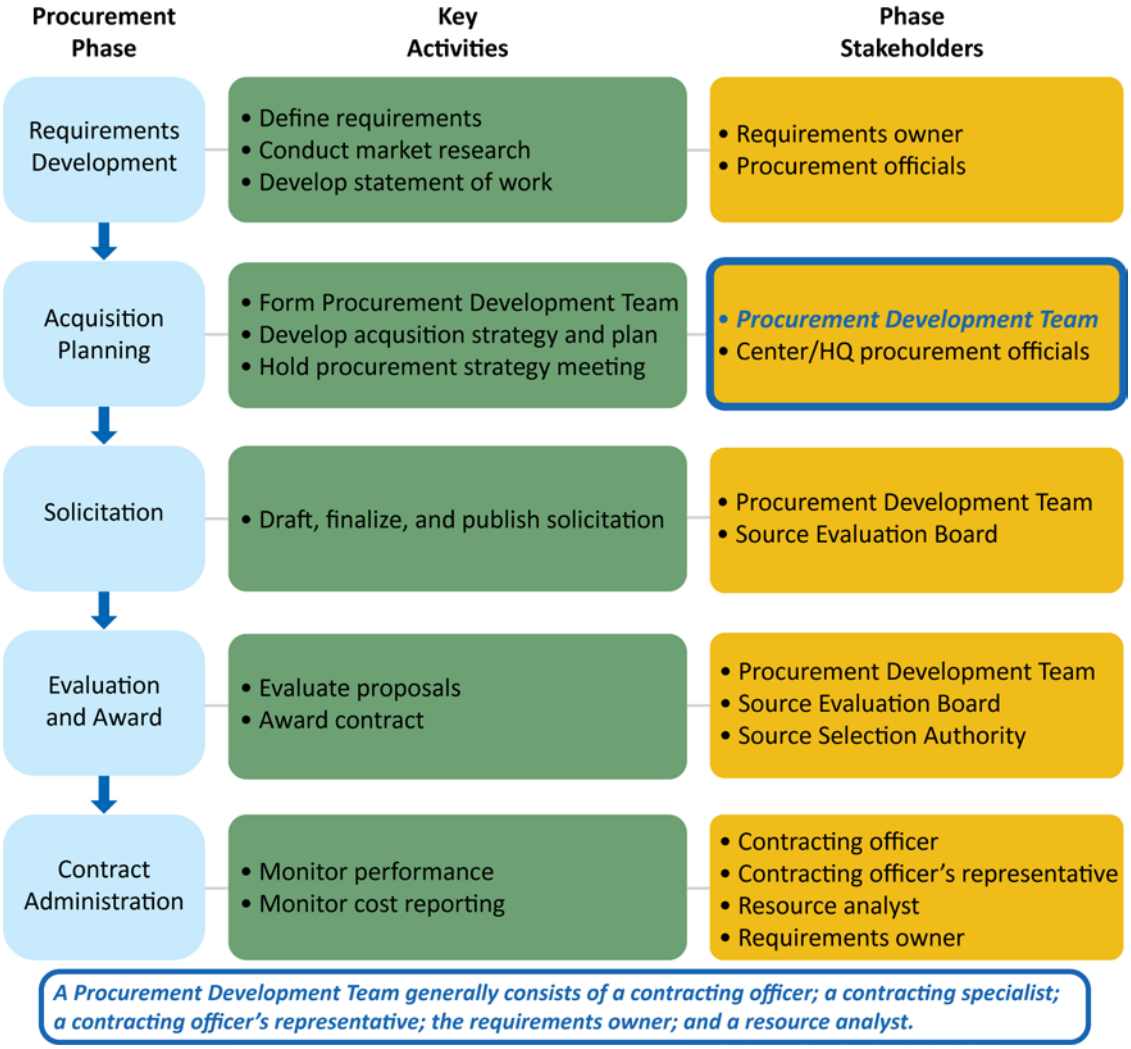
NASA's process for acquiring services is guided by the FAR and the NASA FAR Supplement (NFS). The Headquarters Office of Procurement manages NASA's acquisition process, issues Agency-wide policy guidance, establishes procurement-related regulations, and reviews procurements of $50 million or more.[9] Once approved, contracts are typically delegated back to NASA Centers for administration and management. Centers manage their own budgets and procure mission-related and operational services through their respective Center-based Offices of Procurement. Mission Directorates—the organizations responsible for managing the Agency's portfolio of programs and projects—generally utilize Center Procurement Offices to acquire services at individual sites where work on their projects is underway.[10]

As shown in Figure 1, NASA's acquisition process typically consists of five phases: requirements development; acquisition planning; solicitation; evaluation and award; and contract administration. A variety of stakeholders are involved in the acquisition process, including Headquarters and Center procurement officials and the "requirements organization" or requirements owner requesting the service—typically a program or project office.

[9] In addition, Headquarters also reviews all new procurements for space flight hardware or human space flight systems development, production, or processing expected to exceed $10 million.

[10] NASA has four Mission Directorates – Aeronautics Research, Human Exploration and Operations, Science, and Space Technology.

**Figure 1: NASA's Acquisition Process**




Source: OIG depiction of NASA information.

*Requirements Development.* The first phase of NASA's acquisition process is focused on defining requirements, developing a statement of work, conducting market research to determine whether any commercially available services exist to meet the requirement, and determining whether a small business set-aside is feasible and appropriate.[11] The statement of work describes the services to be performed by a contractor. This phase is usually conducted by the requirements owner requesting the service with assistance from the procurement office. The requirements organization defines all technical requirements and standards and ensures its organization has the funding to procure the services.

[11] Under a small business set-aside, a contract or portions of a contract are reserved exclusively for a small business. Typically, depending on the type of business a firm conducts, they can qualify for small business set-asides based on the number of people they employ or their annual revenue.

*Acquisition Planning.* In the second phase, a Procurement Development Team develops and finalizes the acquisition plan, detailing the overall strategy for managing the acquisition. The procurement development team generally consists of the contracting officer, contracting specialist, contracting officer's representative, requirements owner, and resource analyst.

The Agency also conducts a Procurement Strategy Meeting or written acquisition plan during this phase for awards of $10 million and above. During this meeting, representatives from both Headquarters and appropriate Center program and procurement offices agree upon the final acquisition strategy. Key elements of this written plan include a description of the services to be acquired, lessons learned from predecessor contracts regarding the acquisition process, and consideration of other feasible alternatives for acquiring the service. The plan also includes information on prospective sources, such as: the number of qualified businesses likely to bid; a discussion of how competition will be sought and promoted; information about the source-selection procedures; and a discussion on the type and length of the contract.

*Solicitation.* In the third phase, NASA drafts, finalizes, and publicizes a solicitation. The solicitation includes what services are needed and for what amount of time, how and by when to respond to the solicitation, and what factors will be used to evaluate the response. Contractors' submittals detail proposed costs and how they will meet the Agency's needs as well as any other requested information.

*Evaluation and Award.* The fourth phase, evaluation and award, involves evaluating proposals, making the source selection decision, and awarding the contract. When acquiring complex services, the NFS requires the use of Source Evaluation Board (SEB) procedures to evaluate proposals.[12] The SEB is an evaluation team typically comprised of individuals from the Agency that have knowledge about or expertise in the service being acquired and Agency officials integral to the procurement process. The team evaluates proposals and presents the results to the Source Selection Authority for final contractor selection and contract award by the procurement office.

*Contract Administration.* The final phase includes the management of the contract. Activities in this phase include monitoring contractor cost reporting and performance.

## Contract Structure

As described above, the acquisition strategy documents decisions about how the contract is established and structured. The approved strategy includes determination of the contract type, period of performance, and type of competition.

[12] NFS 1815.300-70(a)(1)(i), "Source Selection, Applicability of Subpart."

### *Contract Type*

The FAR outlines 12 factors that agencies should consider when selecting a contract type, including the acquisition history; pricing strategy; and the type, complexity, and urgency of the requirement.[13] The contract type ultimately depends on whether the government or contractor will bear the most risk for unanticipated costs and how to incentivize efficient performance.[14] With these factors in mind, NASA can choose from a variety of contract vehicles including:

***Fixed-price contracts*** are used when the contractor agrees to deliver a product or service at a set price. Agencies generally use firm-fixed-price contracts when costs and risks can be clearly defined, for example, when purchasing housekeeping services.

***Cost-reimbursement contracts*** require the acquiring agency to pay all allowable costs the contractor incurs in delivering the service or product, and profit is provided by award, fixed, or incentive fees. Cost-reimbursement contracts involve increased risk for the government and are generally more appropriate when performance uncertainties or the likelihood of changes make it difficult to accurately estimate costs in advance.

***Incentive contracts***, such as award-fee contracts, are used to incentivize the contractor's performance. For incentive-fee contracts, the amount of fee or profit payable is related to the contractor's performance, which can provide cost control by motivating performance toward specific schedule targets or technical goals. In award-fee contracts, a predetermined amount of money is set aside for the contractor to earn in whole or in part by meeting or exceeding predetermined performance criteria. At NASA, the Assistant Administrator for Procurement must approve the use of award-fee or incentive-fee contracts.[15]

***Indefinite-delivery, indefinite-quantity (IDIQ) contracts*** are used when the exact times and or quantity of services needed cannot be determined when the contract is awarded.[16] IDIQ contracts are most often used for service contracts and they typically include guaranteed base years and additional option years to be exercised at the government's discretion. Under an IDIQ contract, the government places task orders against a basic contract for individual requirements and the government must order, and the contractor must provide a minimum agreed-upon quantity of services as well as any other quantities ordered by the government up to a stated maximum.

IDIQ contracts may be awarded in two ways—multiple or single award. Multiple-award IDIQs, preferred under the FAR, are used when contracts are awarded to two or more contractors under a single solicitation. Single-award IDIQs are used when only one contract is awarded under a solicitation. The FAR requires that if a single-award IDIQ contract is expected to exceed $112 million, a written determination from the head of the agency is required. The NFS states that single-award IDIQ contracts, to the maximum extent possible, should contain a core requirement (often referred to as the base) that includes the known, defined, and recurring requirements of the acquisition.[17] Task orders are then issued against the IDIQ portion for the undefined requirements, a contract vehicle known as a hybrid IDIQ.

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[13] FAR 16.104, "Factors in Selecting Contract Types."

[14] FAR 16.103(a), "Negotiating Contract Type."

[15] NFS 1816.401(d), "Incentive Contracts-General."

[16] FAR 16.504(a), "Indefinite-Quantity Contracts." An IDIQ contract provides for an indefinite quantity, within stated limits, of supplies or services during a fixed period of time while the government places orders to meet individual requirements.

[17] NFS 1816.504(c), "Indefinite Quantity Contracts."

### *Competition and Period of Performance*

The FAR requires agencies to award contracts through full and open competition and allows for exceptions to this requirement only under certain conditions. Contracts awarded using other than full and open competition must be supported by written justification and approved by the Assistant Administrator for Procurement, Deputy Assistant Administrator for Procurement, or the Center's Deputy Director depending on the estimated value of the contract. When considering competition, agencies may limit participation on a services contract solicitation to only small businesses. This practice is linked to the federal government's long-standing policy of maximizing procurement opportunities for small businesses. When using other than full and open competition, the FAR requires agencies to solicit offers from as many potential sources as is practicable.

The FAR establishes that the maximum length of a service contract is 5 years, often referred to as the period of performance.[18] Service contracts for more than 5 years must be approved by the Assistant Administrator for Procurement.

## NASA's Efforts to Improve Procurement Processes

Over the past 3 years, NASA has conducted multiple assessments of both its technical capabilities and its business services to help ensure the Agency has the right mix of personnel and infrastructure.[19] Although NASA has yet to complete all of these assessments, the overall intent is the development of a more efficient operating model for the Agency—one that balances maintaining and advancing critical capabilities with performing current and future missions.

### *Business Services Assessment*

In 2015, NASA established the BSA to assess mission support services, including procurement, evaluate the health of current mission support capabilities, and identify opportunities to optimize performance. The procurement assessment focused on five key areas: procurement process, workforce, governance and policy, procurement efficiency initiatives, and benchmarking and compliance. Findings and observations were reported to the Mission Support Council—NASA's senior decision-making body for all aspects of its mission support portfolio—in November 2015.[20] As a result, the Mission Support Council directed the Headquarters Office of Procurement to take the following actions to improve the procurement process.

1. Strategic Sourcing: Identify best practices and tools across NASA to develop a more strategic approach to reducing duplication of contracts and costs. This includes establishing a searchable repository of new and existing contracts.

[18] FAR 17.204(e), "Contracts."

[19] NASA defines a technical capability as the equipment, facilities, infrastructure, property, support, and workforce required to accomplish a program or project.

[20] The Mission Support Council members include the Associate Administrator, Deputy Associate Administrator, Associate Administrator for Mission Support, Chief Financial Officer, Chief Information Officer, and Chief of Safety and Mission Assurance.

2. Acquisition Assignments: Initiate a multi-year approach to assigning specific Center Procurement Offices responsibilities to conduct parts of the acquisition process on behalf of the Agency in specialized areas. For example, Ames Research Center became the lead for supercomputing contracts when the Agency consolidated two contracts into one.
3. Contract Administration: Reduce the volume of task orders on single-award IDIQ contracts and revise policies for funding contracts in order to save procurement staff resources.
4. Evaluation Process: Reduce lead times in order to improve the effectiveness of the source evaluation process.
5. Policy and Guidance: Streamline the use of standard policies with an approach that captures metrics that measure success.
6. Knowledge Management: Develop an Agency approach to procurement training for the technical community including SEB members.
7. Project Management: Integrate project management principles into the acquisition process, including metrics, schedule, and milestones to establish a consistent methodology for a timely and efficient contract award process.
8. Leadership: Strengthen leadership commitment and accountability activities associated with acquisition practices.

The Assistant Administrator for Procurement completed implementation of the BSA decisions in April 2018. The Headquarters Office of Procurement took multiple actions to implement each of the decisions with some of the tasks interrelated and satisfying multiple decisions. For example, the Headquarters Office of Procurement created a website with a searchable database of all the Agency's strategic sourcing contracts. This website is also a part of a larger, knowledge management procurement website that houses training and other procurement related policies. Additionally, an SEB community of practice was established to develop, leverage, and share lessons learned and best practices of SEB activities. The Headquarters Office of Procurement also developed guidance for SEB Chairs to assist in managing the overall process including standard templates and timelines.[21]

### *Mission Support Future Architecture Program*

The Mission Support Future Architecture Program (MAP) is NASA's next step to ensure that mission support service activities, including procurement, are as efficient and effective as possible. MAP began in 2017 with a goal to optimize mission support services by moving toward a more interdependent model allowing the Agency to share capabilities across Centers, realigning the budget structure, and transforming service activities through collaboration. In May 2017, the Executive Council approved a phased plan to evaluate and, where appropriate, realign the mission support structure to include budget authority and lines of reporting.[22] The Headquarters Office of Procurement began MAP evaluation activities in July 2018 and is scheduled to begin implementing resulting recommendations by October 2019.

[21] This is not a complete list of all actions or tasks completed to implement the decisions.

[22] The Executive Council is NASA's highest decision making body and makes decisions about sensitive, highly visible investment or divestment recommendations such as changes to the Agency's strategic goals. Executive Council members include the Administrator, Deputy Administrator, Associate Administrator, Deputy Associate Administrator, Chief of Staff, Chief Financial Officer, Chief Scientist, and Chief Technologist.

### *Acquisition Portfolio Assessment Team*

In 2018, the Headquarters Office of Procurement developed an Acquisition Portfolio Assessment Team to address (1) inefficient operations across NASA due to the current decentralized nature of procurement where every Center Procurement Office supports every type of procurement; (2) redundant and duplicative contracts and other instruments that exist across multiple Centers for similar purposes; (3) duplicative capabilities across multiple Centers leading to an increased number of procurement administrative actions, increased number of personnel, and higher costs; and (4) limited procurement workload capacity at Centers contributing to over-constrained capabilities. Currently, the Headquarters Office of Procurement is partnering with the Office of the Chief Engineer to investigate the consolidation of engineering support service contracts.[23] As of September 2018, the assessment team had been established and it had identified a universe of contracts for review.

[23] In September 2017, the Agency Program Management Council, which serves as the Agency's senior decision-making body regarding all programmatic activities and program-related issues, directed the Office of the Chief Engineer to conduct this review. Members include the Associate Administrator, Deputy Associate Administrator, Chief Engineer, Chief of Safety and Mission Assurance, Associate Administrators of NASA's four Mission Directorates, the Associate Administrator for the Mission Support Directorate, Center Directors, Chief Financial Officer, Chief Information Officer, Chief Health and Medical Officer, Chief Scientist, Chief Technologist, and General Counsel.

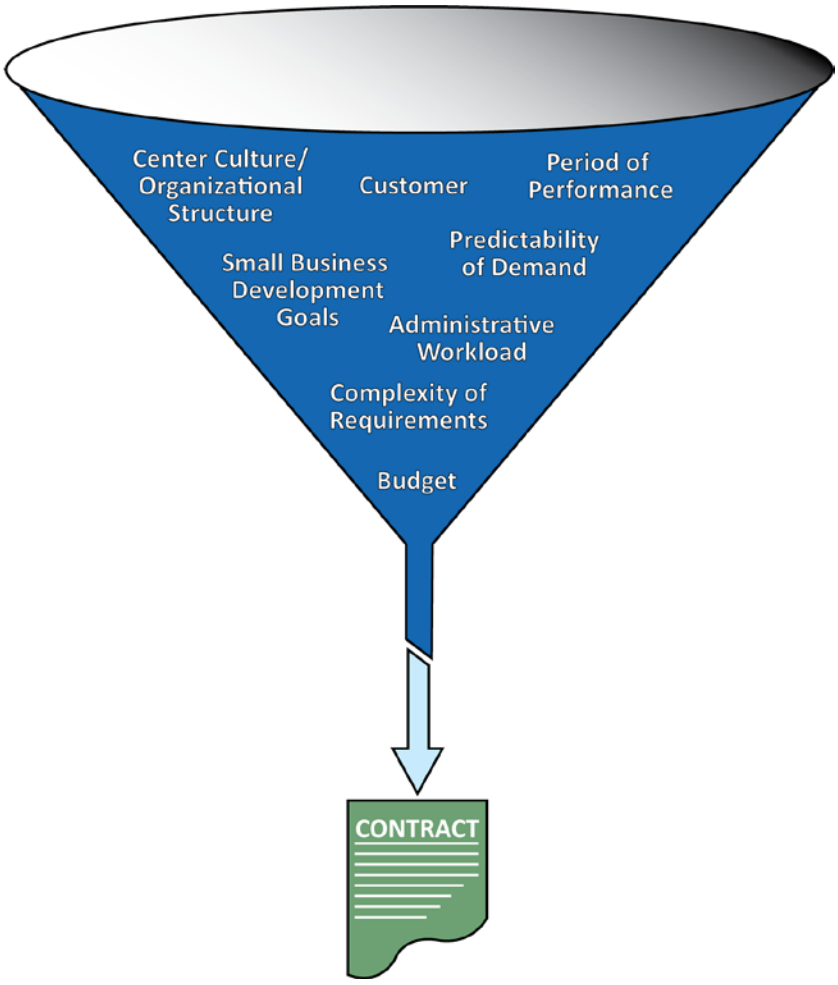
# INSIGHT INTO CONTRACTING EFFICIENCIES LIMITED BY INCONSISTENT DATA COLLECTION AND INFORMATION SHARING

The four NASA Centers we reviewed have changed the structure of their engineering and technical services contracts in an effort to achieve cost savings, streamline technical requirements, and lessen administrative workload. Based on an examination of a dozen contracts awarded since November 2013 and worth more than $4 billion, we found that Centers made these changes to contract structure based on the complexity of requirements, predictability of demand, and each Center's organizational culture. We also found that the Centers' data collection efforts were minimal and informal with regard to determining whether these contract structure changes led to efficiencies. We attribute this, in part, to challenges associated with limited requirements to track such data across the Agency, lessening the likelihood of sharing lessons learned for future acquisitions. We found that such sharing mechanisms at Headquarters and the Centers are informal and are not focused on efficiencies related to cost savings, streamlining technical requirements, and lessening administrative workload. Without a methodology to capture, measure, and share such data, NASA may be missing opportunities to streamline and strengthen acquisitions while achieving savings and reducing duplicative requirements in its service contracts.

## Contract Structures and Potential Efficiencies Are Largely Driven by Requirements and Center Culture

Through our 12 case studies, we identified that changes to contract structure—such as pricing or length of the period of performance—varied based on the complexity of requirements and organizational culture. As shown in Figure 2, multiple factors influence a contract's structure, including requirements, Center culture, period of performance, small business goals, and customers.

**Figure 2: Factors That Influence a Contract's Structure**




Source: OIG analysis of NASA data.

We found that the complexity of requirements along with the volume and predictability of demand for engineering and technical services affected whether Centers adjusted a contract's structure in an effort to gain potential efficiencies such as cost savings, streamlining requirements, and minimizing administrative workload. We also found that the culture of each Center—including its organizational structure, the customers it supports, and its location—influenced how and whether adjustments were made to contract structures.

## Complexity of Requirements

In the context of contract requirements, complexity is a measure of how much risk NASA and the contractor will assume as part of the contractual agreement to provide the service; and the level of difficulty in obtaining the type and level of skills needed to provide the service, setting milestones and projecting a date of completion, and determining the total cost of the acquisition. Less complex requirements include simple, routine efforts that do not require highly skilled labor and tend to be centered on more mature, proven technologies or services. Examples of less complex requirements include maintenance, janitorial services, and grounds keeping. In contrast, highly complex requirements

involve new technology or services or a new application of existing technology or services with a high degree of technical uncertainty requiring state-of-the-art machinery or highly skilled personnel such as development and testing of a satellite or launch vehicle. For example, Goddard's Omnibus Multidisciplinary Engineering Services II contract provides engineering support to several spacecraft programs including the Joint Polar Satellite System and the Satellite Servicing Capabilities Office.[24]

The degree of complexity in a contract's statement of work generally informs the decision whether to use a fixed-price contract or a cost-type contract. Fixed-price contracts, which place more risk with the contractor, are utilized for projects with sufficiently defined requirements. Cost-type contracts are employed when requirements are unique or sufficiently undefined to merit placing more risk with the Agency rather than the contractor. For example, Stennis's Laboratory Services contract had been re-competed several times and included well defined and mature requirements, which enabled Center procurement to utilize a firm-fixed-price contract. In another example, Kennedy utilized a cost-plus-fixed-fee level of effort type contract for its Laboratory Support Services and Operations given variations in the volume and type of work needed to support the Space Launch System rocket, Orion Multi-Purpose Crew Vehicle, and associated ground systems development as these programs transition from development into the operational phase.[25] Kennedy procurement officials noted that the volume of work would likely increase approximately 1 year prior to launches, such as the Exploration Mission-1 launch, and that schedule changes could affect the skill or size of workforce required.[26]

We also found that a contract's period of performance may extend beyond the FAR limit of 5 years due to the complexity of the contract requirements. For example, Langley's Center Maintenance, Operations and Engineering contract has a 10-year period of performance—including contract options—to better ensure contract continuity with the Center's infrastructure revitalization plan. The longer period of performance enables the contractor to build workforce expertise across the contract's functions. In another example, Kennedy procurement officials cited uncertainty regarding the volume of launches and other activities as a basis for utilizing a 9.5-year period of performance—including contract options—for the Expendable Launch Vehicle Integrated Support 3 contract.[27]

Longer periods of performance can be beneficial in that they can lessen the administrative workload associated with awarding and managing multiple iterations of contracts. Conversely, longer award terms limit the opportunities to re-compete the contract and potentially lower costs. Consequently, the Assistant Administrator for Procurement must authorize a period of performance longer than 5 years. In the three case studies that had longer periods of performance, we found the Agency utilized a base period of performance with contract options. This allowed the Agency to exercise an option if the contractor is meeting requirements while lessening the administrative workload associated with awarding multiple contracts. Additionally, Center officials explained that developing the acquisition strategy for the next iteration of a contract typically begins 2 to 3 years prior to its expiration. The

[24] The Joint Polar Satellite System is the Nation's newest polar-orbiting environmental satellite system, and is a collaborative effort with the National Oceanic and Atmospheric Administration. The Satellite Servicing Capabilities Office, now the Satellite Servicing Projects Division, advances the state of robotic servicing technology to enable the routine, on-orbit servicing of satellites that were not designed with servicing in mind.

[25] NASA is developing the Space Launch System, Orion Multi-Purpose Crew Vehicle, and the related ground processing and launch facilities to support human deep space exploration.

[26] Exploration Mission-1, scheduled to launch in 2020, will be the first integrated test of NASA's deep space exploration systems: the Orion spacecraft, Space Launch System rocket, and the supporting ground systems.

[27] In both instances, the deviation for the longer period of performance was approved by the Assistant Administrator for Procurement.

NFS requires early identification of Source Evaluation Board (SEB) members, and Kennedy requirements officials explained that the SEB process is resource intensive, and can be disruptive because asking the best qualified people to serve on the SEB takes them away from their regular duties. In their view, longer periods of performance worked better because it helped offset the amount of administrative work involved.

## Predictability of Workload Demands

We found that the ability of the requirements organization to forecast workload volume and assess the confidence of that forecast affected the type and length of contracts utilized by the Centers. Typically, Centers use either IDIQ contracts or a hybrid approach to mitigate unanticipated changes in workload such as increases or reductions in mission work. For example, in three out of four case studies from Goddard, the Engineering Directorate utilized IDIQ contracts to account for potential variances in mission demand.[28] In the fourth case study, the Software Engineering Services II contract, Goddard utilized a hybrid cost-plus-fixed-fee and IDIQ structure to determine if that approach would reduce administrative workload by including known work in the base portion of the contract and potentially reduce the number of task orders on the IDIQ portion. Kennedy, Langley, and Stennis procurement officials also incorporated IDIQ components into their cost reimbursement contracts and although it is too soon to identify the impact, their reason for doing so was to account for unpredictability in programs, potential new work from the Agency, or to support non-NASA customers.

We also found that anticipated workload volume may lead to variances in the types of contractor incentives, such as fixed or award fees or other flexibilities used to incentivize contractor performance. For example, Langley utilized a 3-year cost-plus-award-fee base for its Technology, Engineering, and Aerospace Mission Support 3 contract, which would transition to two 1-year cost-plus-fixed-fee options, to incentivize contractor performance at the beginning of the contract and reduce administrative workload in the later portion of the contract. Additionally, Kennedy's Laboratory Support Services and Operations contract uses flexibilities within its contract ceiling of work hours, permitting an increase in total contract hours without the administrative burden of performing additional contract actions.[29] In another example, Goddard incorporated a unilateral adjustment clause into its engineering and technical contracts that allows procurement officials to increase the value of the contract up to approximately 30 percent of the total contract value without the need to compete a new contract. A Goddard official stated that uncertainties in volume of work and demand for services can result in time-consuming changes to contracts through contract modifications in order to meet unanticipated customer needs. The unilateral adjustment clause gives the Center the flexibility needed to address unpredictable workload demands with the least amount of administrative burden. While we recognize that Goddard officials use the unilateral adjustment clause as a management tool, a procurement official also explained the risk that contractors, aware of the clause, will advocate for additional work to capture those funds. An official from Goddard explained that, in order to mitigate these risks, they continually monitor contracts to ensure contract ceilings are not reached. They also noted that, if the unilateral adjustment clause is utilized, continual monitoring helps them to adequately justify the use to Headquarters officials.

[28] Goddard utilized cost-plus-fixed-fee IDIQ contracts for the Systems Engineering Advanced Services, Technology and Integrated Discipline Engineering Services, and Omnibus Multidiscipline Engineering Services II acquisitions.

[29] Contract actions include awarding a new contract or modifying an existing contract.

## Organizational Culture

We found that a Center's organizational culture—including its missions, the types of customers it supports, and its location—factors into the structure of engineering and technical contracts. First, the structure of a Center's requirements organization, with some organized by engineering discipline and others organized by product type, impacts the contract structure as discipline-based organizations tend to require continuous contract support for their disciplines. For example, Goddard's Engineering Directorate aligns contracts with its five distinct engineering disciplines and utilizes an IDIQ structure to ensure sufficient contractor support when the Center competes with other Centers or outside entities for mission or project work.[30] Goddard officials explained that having to compete for work requires a balancing act because of the uncertainty regarding what type of work will be won, and that the IDIQ structure permits the Engineering Directorate to support changes in mission requirements or additional work. Officials also explained that unanticipated work related to the James Webb Space Telescope increased the likelihood that the Center's Software Engineering Services II contract would require an increase to its contract value, and therefore the IDIQ structure supported and helped fulfill requirements that could not be exactly determined at the time NASA awarded the contract.[31]

Additionally, Goddard officials stated that they reduced overlap within the statements of work of the engineering and technical contracts when aligning them with the five engineering disciplines. Previously, overlaps in statements of work may have encouraged projects or programs to pick and choose which contract they wanted to use in order to work with their favorite contractor. This resulted in the Center assuming more costs as work was added to the contracts. Engineering Directorate officials explained that, in order to combat this issue, the portfolio of contracts has to be monitored and they have to meet regularly with the Engineering Director to ensure the work is placed on the appropriate contract.

Second, the number and types of customers supported by a Center may affect how contracts are structured and shared across Centers. For example, Kennedy has internal customers (such as the Exploration Ground Systems Program and other NASA Centers) and external commercial customers; therefore, it structures its engineering and technical contracts to balance all of these demands. For instance, the Kennedy Propellants and Life Support Services contract provides propellant services to NASA and commercial customers at Kennedy. Previously, the requirements for propellant services were included in a larger Kennedy contract, and Center officials decided to establish a new contract to increase competition and potentially obtain a lower cost by targeting vendors with expertise in these types of services.[32] Officials explained that separating the propellant services requirements from the larger contract allowed competition to occur sooner than if they had waited for the end of the period of performance on the overall contract. The Center also established an IDIQ structure within the contract to support fluctuating propellant demands for internal and external customers. Additionally, the ability for other NASA Centers to utilize this contract potentially lowers the administrative burden of procuring multiple propellant service contracts.

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[30] Goddard conducts work for the Science Mission Directorate, which in part uses competed missions to address science objectives through mission proposals, generally solicited from teams comprised of people from universities, NASA Centers, industry, and small businesses, and led by a principal investigator.

[31] The James Webb Space Telescope—the scientific successor to the Hubble Space Telescope—is expected to be the premier space-based observatory of the next decade when it is launched in 2021.

[32] The requirements were previously contained within Kennedy's Institutional Services contract.

Third, the location of a Center and its proximity to other NASA Centers or facilities may influence how it structures its contracts including exploring whether contracts can be consolidated or shared. For instance, Stennis Space Center and Michoud Assembly Facility (Michoud), located approximately 45 miles apart, consolidated three contracts for facility operations, maintenance, and engineering services into the Synergy-Achieving Consolidated Operations and Maintenance (SACOM) contract.[33] Stennis officials explained that multiple factors helped drive the decision to consolidate including location, similarities in the types of work performed, budgetary concerns, and direction from Headquarters Mission Directorate officials. Although developing such a large contract took time and required strong management support, the contract led to a closer working relationship between the Center and Facility staff and cost savings to the Agency. SACOM procurement officials estimated that approximately $36.5 million in costs have been saved or avoided over the first 2 years of the contract.[34]

Finally, other considerations such as small business development goals play a role in a contract's structure. During acquisition planning, the NFS dictates that the Agency give maximum consideration to small businesses as prime contractors or encourage prime contractors to include small businesses for subcontractor opportunities. As the overall value of a contract may impact the ability of a small business to compete, Center procurement and requirement officials discuss the impact contract value may have on small business participation and whether it makes sense to consolidate or deconsolidate contracts. For example, although it created additional administrative burden for Center procurement officials, Goddard deconsolidated the Multidisciplinary Engineering and Technical Services II contract by dividing the requirement to create two smaller contracts in order to help meet small business goals.[35]

## Efforts to Collect Data on Contract Structures to Determine Efficiencies Are Limited

We found that NASA's data collection efforts were minimal and informal with regard to determining whether changes in contract structure led to efficiencies. We attribute this, in part, to challenges associated with consistently using metrics and limited requirements to track the resulting data. For example, while Agency officials may discuss potential efficiencies early on in the procurement process, these efficiencies are not consistently tracked or monitored. Additionally, the BSA initiative focused on achieving efficiencies related to the procurement process rather than on efficiencies resulting from changing contract structures, and did not collect data on cost savings, streamlining requirements, or lessening administrative workload beyond reducing acquisition lead times. Absent better data collection, NASA's attempts to gain efficiencies through changes to contract structure will continue to be ad-hoc at best.

[33] The three prior contracts included Michoud's Manufacturing Support and Facility Operations contract, Stennis's Test Operations contract, and Stennis's Facility Operating Services contract. Michoud Assembly Facility is a component of Marshall Space Flight Center.

[34] This estimate does not included additional savings related to reduced square footage for operations space.

[35] The Multidisciplinary Engineering and Technical Services II contract was deconsolidated into the Systems Engineering Advanced Services and Technology and Integrated Discipline Engineering Services contracts.

## Consistent Use of Metrics to Measure Efficiencies is Limited

Through our case studies, we found that Centers made multiple changes to contract structures, including changes to the same contract, with the intention of realizing cost savings—such as transitioning an award-fee contract to a fixed-fee contract or consolidating multiple contracts into one. We identified three metrics that could provide insight into how contract structure changes and potential efficiencies are measured.

- **Cost savings**—can be determined by comparing overall costs from a current contract to its predecessor. At the transactional level, task orders can also be compared for greater insight into cost and for transitioning IDIQ to core work.
- **Duplicate requirements**—identifying duplicate requirements among contracts that have been removed or minimized and the resulting efficiencies. This can be measured by (1) the reduction in the number of requirements and (2) the costs avoided from paying multiple overhead charges for the same requirements.[36]
- **Administrative workload**—the number of hours the Agency spends establishing and managing a contract—with the efficiency measured in terms of a reduction in hours. For example, consolidating contracts or lengthening the period of performance of a contract can streamline the acquisition process and save significant administrative costs by avoiding multiple or quickly recurring acquisition planning phases.

For the contracts we reviewed, procurement officials said they considered these metrics during acquisition planning; however, NASA has limited requirements to collect data on these metrics throughout a contract's life cycle. Such data would help the Agency ensure the anticipated efficiencies are achieved and assess what actions contributed to the efficiencies. We identified a similar issue in our 2014 report that found limited involvement by Headquarters procurement officials in tracking metrics related to strategic sourcing initiatives.[37] This led to the lack of performance measurement at the Center-level; limited awareness of Agency-wide programmatic success; and NASA being unable to determine the extent of efficiencies, including cost savings, achieved through its Strategic Sourcing Program. Changes NASA made to the procurement process as a result of the recent BSA focused, in part, on collecting performance data regarding streamlining the SEB process; however, establishing metrics related to contract changes and resulting efficiencies was not addressed by the BSA. Headquarters and Center procurement officials whom we interviewed said that efficiencies are tracked informally and offered only anecdotal examples of savings.

We found that Centers that faced budgetary concerns were more likely to track cost savings. For example, Stennis officials stated they had received direction from Headquarters Mission Directorate officials to find cost savings when they established the SACOM contract and have been tracking those savings. Likewise, Langley officials stated that, as a small Center, they are concerned about budgetary issues and consequently informally monitor contract savings.

One of the Centers we reviewed informally tracked efficiencies gained by removing overlap between requirements. As previously noted, Goddard Engineering Directorate officials reported that they had identified a number of requirements that overlapped among contracts and then monitored the amount

[36] Overhead costs include items or benefits that cannot be directly related to a single product or service being provided, such as rent or the salaries for staff services like legal and accounting.

[37] IG-14-010.

of duplication removed. However, this data was informally collected and we found that the metrics used at Goddard were not used at the other three Centers we reviewed.

Likewise, Kennedy and Langley officials told us that while they did not formally collect metrics on administrative workload, it is likely that contract changes such as longer periods of performance can result in less administrative work for Center procurement officials because they are recompeting contracts less frequently.

## Analysis of Data Can Be Challenging

Centers may face challenges assessing the extent to which contract structure changes lead to efficiencies. First, comparing a current contract to its predecessor may not be straightforward. For some of the contracts we reviewed, requirements were changed when the contract was recompeted. For example, the Center Maintenance, Operations and Engineering contract at Langley removed information technology requirements that were in its predecessor contract. Similarly, because engineering and technical requirements vary from Center to Center and contract to contract, it is difficult to compare these types of contracts across the Agency. For example, Kennedy focuses on launching space vehicles while Stennis is focused on propulsion testing. Moreover, NASA officials stated that it is difficult to identify the entire universe of engineering and technical service contracts, which makes it challenging to find comparable contracts.[38] Further, multiple types of contract structure changes (such as contract type or length of performance) are often made to a contract, which makes it difficult to isolate what specific changes led to efficiencies. And, it is difficult to come to conclusions on efficiencies gained from one contract to the next when the current contract is still ongoing. For example, Stennis officials stated that the costs early on in the SACOM contract were higher as the contractor adapted to requirement changes. However, officials have calculated initial savings of $36.5 million in the first 2 years of the contract, and expect to see additional savings in the later stages of the contract.

Headquarters procurement officials do not require Centers to collect metrics related to efficiencies and stated that some contract structure changes are not always the result of a need to achieve efficiencies. Rather, as noted previously, changes can be the result of limited budgetary resources, limited administrative resources, or fluctuating requirements. While we recognize the challenges in analyzing efficiency metrics, there is value in determining what actions lead to efficiencies. Utilizing standardized metrics for cost savings or removing duplicate requirements ensures that data on intended efficiencies can be verified and shared with others as NASA continues to assess its procurement organization through the MAP and Acquisition Portfolio Assessment Team reviews.

[38] As of September 2018, the Agency's Acquisition Portfolio Assessment Team was working to identify a universe of engineering support service contracts to determine whether consolidation of these contracts is possible.

# Limited Sharing of Lessons Learned

NASA has a variety of mechanisms at the Headquarters and Center levels to share lessons learned; however, many of these are informal, dependent upon personal relationships between Centers, and not focused on sharing information on efficiencies—such as cost savings, removing duplicative requirements, or lessening administrative workload—gained from changes in contract structure.

The delegation of acquisition planning activities from Headquarters to Centers, coupled with the Agency's informal mechanisms to share lessons learned, may result in missed opportunities to share lessons learned. Of our 12 case studies, 10 were delegated from Headquarters back to the Center. In previous work, we identified similar factors that limited the Agency's ability to share lessons learned. In 2014, we found that the Agency's decentralized organizational structure contributed to a lack of communication between Headquarters and Center Procurement offices on strategic sourcing.[39]

Many of NASA's informal information sharing mechanisms are dependent upon personal relationships between procurement and requirements organizations on a specific Center and between Centers. For example, Goddard procurement officials reported that during contract administration there are often informal discussions between the contracting officer, contracting officer's representative, and the requirements organization regarding contractor performance as well as review of contractor performance data. Similarly, at Stennis, while developing requirements for the SACOM contract, Center officials identified better methods to procure services for the Center, such as potentially consolidating contracts. We also found that sharing of lessons learned between Centers was also informal. For example, personal relationships between officials at Stennis and Marshall Space Flight Center led to the discussion of consolidating the laboratory services contract at Michoud with a contract at Stennis.

NASA has formal mechanisms to share procurement information at the Headquarters-level, such as the Office of Procurement's SEB Community of Practice and knowledge management activities; however, these mechanisms do not focus on sharing lessons learned related to efficiencies resulting from contract structure changes. Instead, they focus on sharing best practices and providing guidance and advice related to serving on an SEB. Further, the 2015 Procurement BSA found that the Agency had inconsistent gathering and sharing of source evaluation lessons learned with requirements organizations. The assessment also found that Centers benefited from including procurement development team members who developed acquisition materials on the SEB. Consequently, the Mission Support Council directed Headquarters Procurement to establish an Agency-wide community of practice focused on the SEB process to share lessons learned, identify best practices, establish sample templates, and provide expert guidance. Additionally, the assessment team identified a need to better institutionalize knowledge management activities, such as procurement training e-tools for requirements organizations, in order to enable better information sharing. As a result, a procurement knowledge officer was appointed at Headquarters to centralize guidance documents, training, and lessons learned into a single online portal, focused on procurement processes. Headquarters procurement officials also identified other forums for sharing, including regular meetings with senior Center-level procurement officials, Procurement Management Reviews, and peer review of Center procurement activities.[40] These mechanisms are intended to better share information regarding

[39] IG-14-010.

[40] Procurement Management Reviews includes interviews with technical and procurement personnel regarding the effectiveness of the procurement organization and a review of contracting actions focused on compliance with procurement statutes, regulations, and procedures. The Reviews identify strengths and weaknesses within the Agency's procurement system.

procurement process activities, and could be used to identify and share efficiencies resulting from changes to a contract's structure.

Formal mechanisms for sharing information regarding procurement process activities also exist at the Center-level, mainly through the Agency's acquisition planning process. Acquisition plans and Center-level acquisitions subject to Headquarters-level Procurement Strategy Meetings provided opportunities to share information. The NFS states that acquisition plans should include coordination with respective Center offices, such as information technology, to assure the acquisition is structured in accordance with Agency policies.[41] Additionally, the plans should identify relevant background information, including knowledge gained and lessons learned from predecessor contracts to further refine acquisition requirements, strategies, and mitigate issues, if any, in the follow-on acquisition.[42] Acquisition plans, however, are limited to a particular acquisition at a single point in time thus limiting the ability of procurement officials to share and retain lessons learned on an ongoing basis for future acquisitions. Similarly, Center-level acquisitions subject to Headquarters-level approval require a Procurement Strategy Meeting, which includes discussion of a history of the acquisition and its relationship to other ongoing contracts or programs; however, these plans are also limited to that particular acquisition.

NASA's recent efforts, such as the BSA, have resulted in a greater willingness among Center procurement officials to share contracts and procurement information. The BSA identified inadequate collaboration due to the decentralized nature of the procurement function within NASA, with Center procurement offices directly supporting on-Center programs and projects. Additionally, resource constraint issues with SEB personnel—such as members balancing the work of their assigned positions with the additional duty of serving on the SEB—contributed to the unwillingness to share information. As part of the resulting BSA decisions, Headquarters procurement officials have begun to share specialized procurement expertise and functions across the Centers in order to serve as leaders in specified procurement areas. For example, the Multiple Award Construction Contracts II, awarded through Stennis Space Center, is a regionalized IDIQ contract for small and large general construction projects and is available for use by NASA Centers and federal tenants at NASA facilities. Procurement officials have also identified the BSA as resulting in a greater focus on sharing procurement information and opening other Center contracts, including engineering and technical service contracts, to other Centers.

NASA policy has long encouraged sharing of knowledge "to continuously improve the performance of [the Agency] in implementing its mission."[43] Additionally, NASA's Procurement Tenets emphasize the need to share best practices and lessons learned for future use. Although we are encouraged by the greater willingness to share procurement information engendered by the BSA process, the lack of a formal sharing mechanism will likely continue to limit the Agency's ability to share information regarding efficiencies.

[41] NFS 1807.104, "General Procedures."

[42] NFS 1807.105(a), "Contents of Written Acquisition Plans."

[43] NASA Policy Directive 7120.6, *Knowledge Policy on Programs and Projects* (November 26, 2013).

# CONCLUSION

As NASA continues to assess its overall procurement processes and organization through the Mission Support Future Architecture Program (MAP) and Acquisition Portfolio Assessment Team reviews, it would be beneficial for the Agency to also focus on identifying efficiencies gained from contract structure changes. These changes, typically driven by the complexity and demand of a contract's requirements as well as the culture of the Center, can be identified and measured by data and standardized metrics. Almost as important as gathering the data is the sharing of potential efficiencies among Headquarters and Center procurement officials. However, without a formalized mechanism to do so, NASA is limited in its ability to share best practices related to changes in contract structure.

# RECOMMENDATIONS, MANAGEMENT'S RESPONSE, AND OUR EVALUATION

As NASA continues with efforts such as the MAP and Acquisition Assessment Portfolio Team reviews and in order to identify efficiencies and promote sharing of best practices related to contract structures for service contracts, we recommended NASA's Assistant Administrator for Procurement:

1. Develop an Agency-wide standardized set of metrics for contracts that can be collected, tracked, and analyzed over time to identify efficiencies resulting from a change in contract structure.
2. Require Center Procurement Offices to formally collect, track, and report data to the Headquarters Office of Procurement on these metrics at least annually.
3. Develop a community of practice to analyze what contract structure changes lead to the greatest efficiencies and to share these lessons learned with the Agency's procurement community.

We provided a draft of this report to NASA management who concurred or partially concurred with our recommendations and described actions the Agency plans to take to address them. We consider management's comments responsive; therefore, the recommendations are resolved and will be closed upon verification and completion of the proposed corrective actions.

Management's comments are reproduced in Appendix C. Technical comments provided by management have also been incorporated, as appropriate.

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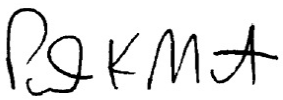
Major contributors to this report include Raymond Tolomeo, Science and Aeronautics Research Director; Tekla Colón, Project Manager; Benjamin Patterson, Rebecca Pselos, Mona Mann; and Matt Ward, editor.

If you have questions about this report or wish to comment on the quality or usefulness of this report, contact Laurence Hawkins, Audit Operations and Quality Assurance Director, at 202-358-1543 or laurence.b.hawkins@nasa.gov.



Paul K. Martin
Inspector General

# APPENDIX A: SCOPE AND METHODOLOGY

We performed this audit from February 2018 through February 2019 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

To gain an understanding of NASA's procurement processes we conducted interviews with Agency officials and reviewed a judgmental sample of case studies. We interviewed Headquarters procurement officials—including the Assistant Administrator for Procurement—and Center procurement officials at Goddard, Kennedy, Langley, and Stennis about the overall process for acquiring services. We chose to use a case study approach in order to understand NASA's acquisition process and how it varied across the Centers as well as to test whether it was followed in the selected contracts. We focused on the process for acquiring services to include defining requirements, acquisition planning, soliciting and evaluating proposals.[44] We judgmentally selected engineering and technical service contracts to use as case studies for this audit based on discussions with Headquarters procurement officials who explained the challenges inherent in procuring complex engineering and technical services.

We identified 12 contracts across four Centers to use as case studies with a total potential value of $4.1 billion. We reviewed relevant acquisition planning and contract documents and conducted interviews with Center leadership officials of the respective engineering directorates as well as other Center requirement organizations. We met with procurement officers, contracting officers, contracting officers' representatives, SEB members, and other members of the Procurement Development Teams for the selected contracts. In order to select our 12 case studies, we obtained the universe of NASA service contracts with a potential value of at least $20 million awarded between FYs 2015 and 2017, using the Federal Procurement Data System-Next Generation. We further refined our universe by judgmentally identifying product and service codes that represented the acquisition of engineering and technical services. Finally, we identified contract characteristics such as contract type, period of performance, and location to select case studies. During survey work, we identified other potential contracts at Kennedy based on Center officials identifying these contracts as having a high percentage of engineering work. Additionally, we added one contract awarded in FY 2014 from Langley because of its high dollar value. We selected and reviewed four contracts at Goddard, four contracts at Kennedy, two contracts at Langley, and two contracts at Stennis.

To gain an understanding of NASA's ongoing initiatives related to ensuring efficiency in its organization and procurement processes we interviewed Headquarters and Center officials involved with the BSA, MAP, and the Acquisition Portfolio Assessment Team. We also reviewed relevant documentation used to implement the decisions resulting from the Business Services Assessment.

[44] We did not review contract award, administration, or management processes.

We reviewed the following Federal and NASA regulations and policy:

- FAR Part 6, "Competition Requirements"
- FAR Part 7, "Acquisition Plans"
- FAR Part 10, "Market Research"
- FAR Part 15, "Contracting By Negotiation"
- FAR Part 16, "Types of Contracts"
- FAR Part 17, "Special Contracting Methods"
- FAR Part 19, "Small Business Programs"
- FAR Part 37, "Service Contracting"
- NFS Part 1806, "Competition Requirements"
- NFS Part 1807, "Acquisition Planning"
- NFS Part 1815, "Contracting By Negotiation"
- NFS Part 1816, "Types of Contracts"
- NFS Part 1819, "Small Business Programs"
- NFS Part 1837, "Service Contracting"
- NASA Policy Directive 7120.6, *Knowledge Policy on Programs and Projects* (November 26, 2013)

## Use of Computer-Processed Data

We used limited computer processed data including acquisition planning and contract documents to perform this audit. Generally, we concluded the data was valid and reliable for purposes of our review.

## Review of Internal Controls

We reviewed and evaluated internal controls related to NASA's acquisition of service contracts. We reviewed the appropriate federal and NASA regulations as well as relevant acquisition planning documents. In addition, we conducted interviews with appropriate members of the Procurement Development Teams associated with our case studies. We concluded that the internal controls were adequate, except for those discussed in the report. Our recommendations, if implemented, should correct the weaknesses identified.

# Prior Coverage

During the last 7 years, the NASA Office of Inspector General (OIG) and the Government Accountability Office (GAO) have issued 10 reports of significant relevance to the subject of this report. Unrestricted reports can be accessed at https://oig.nasa.gov/audits/auditReports.html and http://www.gao.gov, respectively.

## *NASA Office of Inspector General*

*Audit of NASA's Engineering Services Contract at Kennedy Space Center* (IG-16-017, May 5, 2016)

*Costs Incurred on NASA's Cost-Type Contracts* (IG-15-010, December 17, 2014)

*NASA's Strategic Sourcing Program* (IG-14-010, January 15, 2014)

*NASA's Use of Award-Fee Contracts* (IG-14-003, November 19, 2013)

## *Government Accountability Office*

*Federal Contracting: Improvement Needed in How Some Agencies Report Personal Services Contracts* (GAO-17-610, July 27, 2017)

*Defense Contracting: DOD Needs Better Information on Incentive Outcomes* (GAO-17-291, July 11, 2017)

*Service Contracts: Agencies Should Take Steps to More Effectively Use Independent Government Cost Estimates* (GAO-17-398, May 17, 2017)

*Contracting Data Analysis: Assessment of Government-wide Trends* (GAO-17-244SP, March 9, 2017)

*DOD Service Acquisition: Improved Use of Available Data Needed to Better Manage and Forecast Service Contract Requirements* (GAO-16-119, February 18, 2016)

*Strategic Sourcing: Improved and Expanded Use Could Save Billions in Annual Procurement Costs* (GAO-12-919, September 20, 2012)

# APPENDIX B: LIST OF ENGINEERING AND TECHNICAL SERVICES CONTRACTS USED AS CASE STUDIES

The following tables show the 12 contracts from the 4 Centers we used as case studies.

| Center, Contract Name, Number, and Description | Contractor | Type | Period of Performance | Potential Value (in millions) |
|---|---|---|---|---|
| **Goddard Space Flight Center** | | | | |
| Omnibus Multidiscipline Engineering Services II NNG17CR69C<br><br>Design, development, integration, testing, and operations of spaceflight, and ground system hardware and software, for space and science missions. | Science Applications International Corporation | Cost-plus-fixed-fee, IDIQ | 5 Years<br><br>7/1/2017 – 6/30/2022 | $620 |
| Systems Engineering Advanced Services NNG15CR66C<br><br>Mission and instrument engineering services for the formulation and implementation of flight and ground systems and the development and validation of new technologies. | Alcyon Technical Services Joint Venture, LLC | Cost-plus-fixed-fee, IDIQ | 5 Years<br><br>10/15/2015 – 10/14/2020 | $188 |
| Software Engineering Services II NNG15CR67C<br><br>Development, operations, and sustaining engineering of software and information systems. | Arctic Slope Technical Services, Inc. | Hybrid cost-plus-fixed-fee, IDIQ | 5 Years<br><br>4/1/2016 – 3/31/2021 | $273.7 |
| Technology and Integrated Discipline Engineering Services NNG15CR65C<br><br>Formulation, design, development, testing, and operations of guidance, navigation and control space flight and ground system hardware and software. | Trident Vantage Systems, LLC | Cost-plus-fixed-fee, IDIQ | 5 Years<br><br>9/23/2015 – 10/31/2020 | $114 |

| Center, Contract Name, Number, and Description | Contractor | Type | Period of Performance | Potential Value (in millions) |
|---|---|---|---|---|
| **Kennedy Space Center** | | | | |
| Expendable Launch Vehicle Integrated Support 3 NNK17LA01C<br><br>Supports the provision of end-to-end launch services for NASA and NASA-sponsored payloads on commercial expendable launch vehicles. | a.i. solutions, Inc. | Cost-plus-fixed-fee, with an award-term option incentive, and firm-fixed-price IDIQ component | 9.5 Years<br><br>4/1/2017 – 9/30/2026 | $332.6 |
| Kennedy Environmental and Medical NNK16OB01C<br><br>Provides environmental management, environmental health, and occupational medicine services. | Integrated Mission Support Services, LLC | Cost-plus-award-fee, IDIQ | 5 Years<br><br>10/1/2015 – 9/30/2020 | $103.7 |
| KSC Propellants and Life Support Services NNK15OL50B<br><br>Provides propellants and life support operations, maintenance, and engineering support and equipment for NASA and other launch processing facilities. | URS Federal Services, Inc. | Firm-fixed-price, IDIQ | 5 years<br><br>10/1/2015 – 9/30/2020 | $93 |
| Laboratory Support Services and Operations 80KSC017C0012<br><br>Laboratory maintenance and support; operational laboratory services; and professional and technical support for scientific research and engineering analysis, test and evaluation in laboratory environments. | URS Federal Services, Inc. | Cost-plus-fixed-fee, level of effort | 5 years<br><br>8/1/2017 – 9/30/2022 | $71 |

| Center, Contract Name, Number, and Description | Contractor | Type | Period of Performance | Potential Value (in millions) |
|---|---|---|---|---|
| **Langley Research Center** | | | | |
| Center Maintenance, Operations and Engineering NNL13AA14C<br><br>Provides core support services in the areas of institutional and research operations, maintenance and engineering. | Jacobs Technology, Inc. | Hybrid cost-plus-award-fee core component, and a combination firm-fixed-price and cost-plus-award-fee IDIQ component | 10 years<br><br>11/1/2013 – 10/30/2023 | $742.2 |
| Technology, Engineering, and Aerospace Mission Support 3 80LARC17C0003<br><br>Conduct and support research and technology development in support of scientific research engineering design analysis and development technology readiness level advancement associated with evolving NASA missions. | Analytical Mechanics Associates, Inc. | Hybrid cost-plus-award-fee/cost-plus-fixed-fee, IDIQ | 5 years<br><br>10/17/2017 – 9/30/2022 | $324.4 |

| Center, Contract Name, Number, and Description | Contractor | Type | Period of Performance | Potential Value (in millions) |
|---|---|---|---|---|
| **Stennis Space Center** | | | | |
| Synergy-Achieving Consolidated Operations and Maintenance (SACOM) NNS15AA01C<br><br>Provide consolidated facility operations and maintenance services for institutional and technical facilities, and perform test and manufacturing support service. | Syncom Space Services, LLC | Hybrid cost-plus-incentive-fee, firm-fixed-price IDIQ with an award-term option | 10 years<br><br>7/2/2015 – 6/30/2025 | $1,248.2 |
| Laboratory Services NNS15AA53C<br><br>Range of laboratory services in the following areas: metrology and calibration; gas and material science; environmental science; and geographical information services. | AAR, JV | Firm-fixed-price, with an IDIQ component | 5 years<br><br>4/1/2015 – 4/30/2020 | $27.9 |

Source: Federal Procurement Data System-Next Generation information and OIG analysis of procurement documents.

# APPENDIX C: MANAGEMENT'S COMMENTS

National Aeronautics and Space Administration
**Headquarters**
Washington, DC 20546-0001

March 22, 2019

Reply to Attn of: Office of Procurement

TO: Assistant Inspector General for Audits

FROM: Assistant Administrator for Procurement

SUBJECT: Agency Response to OIG Draft Report, "NASA's Engineering and Technical Services Contracts" (A-18-009-00)

NASA appreciates the opportunity to review and comment on the Office of Inspector General (OIG) draft report entitled, "NASA's Engineering and Technical Service Contracts" (A-18-009-00) dated February 22, 2019.

In the report, the OIG found that in general, NASA Centers have made changes to the structure of its engineering and technical services contracts—such as the type of contract pricing or the length of the period of performance—in an effort to achieve cost savings, streamline technical requirements, and lessen administrative workload. However, while recent procurement assessment efforts have focused on achieving efficiencies in the procurement process, data collection efforts related to determining whether these changes led to efficiencies were minimal.

The OIG makes three recommendations to NASA's Assistant Administrator for Procurement designed to identify efficiencies and promote sharing of best practices related to contract structures for service contracts.

Specifically, the OIG recommends NASA's Assistant Administrator for Procurement:

**Recommendation 1:** Develop an Agency-wide standardized set of metrics for contracts that can be collected, tracked, and analyzed over time to identify efficiencies resulting from a change in contract structure.

**Management's Response:** The NASA Office of Procurement concurs. As the office continues to analyze its processes for improving efficiencies a procedure for identifying efficiencies resulting from changes in contract structure and a corresponding metric will be developed and as part of the organization's Mission Support Future Architecture Program (MAP) progress report.

**Estimated Completion Date:** March 1, 2020

**Recommendation 2:** Require Center Procurement Offices to formally collect, track, and report data to the Headquarters Office of Procurement on these metrics at least annually.

**Management's Response:** The NASA Office of Procurement concurs. In order to obtain this data, Headquarters will collect this information from the procuring locations. Therefore, Recommendations 1 and 2 work in parallel.

**Estimated Completion Date:** October 30, 2020; first annual submission with data from the previous fiscal year.

**Recommendation 3:** Develop a community of practice to analyze what contract structure changes lead to the greatest efficiencies and to share these lessons learned with the Agency's procurement community.

**Management's Response:** The NASA Office of Procurement partially concurs. The NASA Office of Procurement is committed to efficiently and strategically procuring services. Specifically as it relates to engineering services, the Office of Procurement is partnering with the Office of the Chief Engineer to effectively manage the Agency's engineering contracts as indicated in the September 2018 Procurement Information Circular entitled "Strategic Approach to Acquisition Strategies by Institutional Product Service Lines."

Contract structure changes are somewhat infrequent, and without a significant increase, do not require the formulation of a Community of Practice (CoP). The Office of Procurement agrees that it is important to analyze contract structure changes that may lead to the greatest efficiencies and concurs with the necessity to share the lessons learned within the Agency's procurement community, not just for this area, but for all key areas affecting the Agency's acquisition processes.

The Procurement Officers at the NASA Centers review and are responsible for acquisition strategies for Center-level procurements. Additionally, they review strategies that, depending on the dollar value, are eventually briefed at the Headquarters level. Concerns (i.e., "red flags") about a potential change and whether or not it is in the best interest of the Government would potentially be noted by the Procurement Officer as the initial approval level for proposed strategies.

Rather than a CoP, the Assistant Administrator for Procurement will require the Centers to report efficiencies resulting from a change in contract structure at an appropriate existing forum (e.g., Procurement Officer Monthly telecon, Procurement Leadership Meeting, etc.). As the Office of Procurement transforms under MAP, it is anticipated that lessons learned in all acquisition-related areas will flow more directly to the larger procurement community within the forthcoming organizational structure.

**Estimated Completion Date:** November 30, 2020

Once again, thank you for the opportunity to review and comment on the subject draft report. If you have any questions or require additional information regarding this response, please contact Cheryl Robertson on (202) 358-0667.

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# APPENDIX D: REPORT DISTRIBUTION

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    Subcommittee on Aviation and Space

Senate Committee on Homeland Security and Governmental Affairs

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House Committee on Oversight and Reform
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House Committee on Science, Space, and Technology
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**(Assignment No. A-18-009-00)**