National Aeronautics and Space Administration

Office of Inspector General
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TO: Larry N. Sweet
NASA Chief Information Officer

FROM: Paul K. Martin
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SUBJECT: Review of NASA's Agency Consolidated End-User Services Contract (IG-14-013)

In December 2010, NASA awarded the Agency Consolidated End-User Services (ACES) contract to HP Enterprise Services (HP) to provide desktop computers, laptops, mobile devices, printers, and other computing equipment as well as end-user services, such as a help desk and data backup, to NASA employees and contractors. The ACES contract is a firm fixed price, indefinite-delivery/indefinite-quantity contract with a maximum value of $2.5 billion. The 4-year contract runs from November 2011 through October 2015, after which NASA may extend the contract under two, 3-year options. With the ACES contract, NASA moved from a Center-based end-user services delivery model under which the individual Centers had greater control over products and services to a centrally managed, Agency-wide end-user services model. By adopting this enterprise model for its most common information technology (IT) services, NASA hoped to save money and enhance the security of its IT systems through leveraging economies of scale and standardizing institutional IT architecture.

However, NASA and HP have encountered significant problems implementing the ACES contract, including a failed effort to replace most NASA employees' computers within the first 6 months and low customer satisfaction. Given that NASA is halfway through the base contract period, it must soon decide whether to exercise the first 3-year option or end the contract after the base period and find another way to obtain these critical IT services.

The ACES contract requires that prior to exercising an option to extend the contract, the Agency's Contracting Officer must determine that doing so is the most advantageous method of fulfilling NASA's IT requirements. To support that determination, the Office of the Chief Information Officer (OCIO) and the Contracting Officer must analyze option

prices, HP's performance, current market conditions, advances in technology, and other programmatic factors. This analysis must allow sufficient time for NASA officials to pursue appropriate alternative approaches with minimal impact to the Agency in terms of technical, cost, or schedule risk should they conclude the best path forward is not to extend the ACES contract.

The Office of Inspector General (OIG) initiated an audit of the ACES contract in April 2013 to determine whether the contract is improving employee end-user services, realizing cost savings and other efficiencies, and meeting Agency mission requirements. However, given that the time is fast approaching for NASA to decide whether to extend the ACES contract or seek other options, we are truncating our audit work and issuing this memorandum to enable NASA to consider the issues we identified during the course of our review. In light of the criticality of the IT services provided under the ACES contract, NASA's decision on how to move forward will directly affect NASA's more than 17,000 employees and thousands of contractors.

Executive Summary

NASA's lack of adequate preparation prior to deploying the ACES contract together with HP's failure to meet important contract objectives has resulted in the contract falling short of Agency expectations. We attribute these shortcomings to several factors, including a lack of technical and cultural readiness by NASA for an Agency-wide IT delivery model, unclear contract requirements, and the failure of HP to deliver on some of its promises. In general, these issues fall into two categories: (1) issues related to the Agency's overall IT governance and (2) management and problems specific to the ACES contract.

NASA Not Prepared for an Enterprise-wide IT Approach. Moving from a Center-managed IT services contract to a centrally managed enterprise-wide end-user services delivery model required a cultural transition at NASA. Based on our previous work and work for this review, we found the transition has been difficult and remains incomplete. As noted in our June 2013 audit report, NASA's current IT governance model is ineffective, overly complex, and not suitable for managing an Agency-wide IT environment.[1] Implementing an enterprise delivery model within a historically decentralized IT environment requires a strong governance structure in which authority is exercised from an Agency-wide perspective, "buy-in" is obtained from key stakeholders, and adequate consideration is given to the state of the organization's current and future IT needs. However, NASA did not adequately address the shortcomings in its IT governance practices prior to initiation of the ACES contract. Consequently, the Agency has been trying to implement an enterprise-wide IT solution across a decentralized and disparate IT environment led by a management culture largely resistant to such change.

[1] NASA OIG, "NASA's Information Technology Governance" (IG-13-015, June 5, 2013).

Contract Not Meeting Agency Goals. Poor implementation by HP on important aspects of the contract and inconsistent oversight by NASA have contributed to the ACES contract failing to meet Agency expectations. Overall, we found that NASA employees have a negative perception of the ACES "brand." We believe HP's failure to replace or "refresh" computers across the Agency at the start of the contract as promised, the inability of HP and NASA to maintain a complete and accurate inventory of IT equipment, and inaccuracies in billing invoices greatly contribute to this perception. NASA's lack of a complete system for ordering IT equipment and services further hinders the success of the ACES contract. Finally, top NASA IT officials expressed the view that HP is performing poorly under the contract even after taking into consideration the Agency's failure to establish sound performance metrics.

NASA is fast approaching a critical decision point when it must weigh the benefits of exercising the first 3-year option period or ending the ACES contract and seeking alternatives to meet the Agency's IT needs. Regardless of its decision, NASA must ensure that its choice aligns with the Agency's overall enterprise architecture and can be executed within the current and planned IT environment and within the expected budget. We urge Agency officials to consider the issues we highlight in this memorandum when determining how best to meet NASA's future IT needs. We provided management with our draft memorandum for review and have incorporated the resulting technical comments, as appropriate.

Background

For more than a decade, Lockheed Martin Corporation provided NASA with IT end-user services under the Outsourcing Desktop Initiative for NASA (ODIN) contract. Each NASA Center could tailor the ODIN contract to meet its needs using Center-specific delivery orders and Centers had the flexibility to purchase varying hardware and services and establish security parameters to meet Center-specific needs. Additionally, each Center had its own contracting and support staff assigned to the contract.

The ACES contract is one of four contracts that make up NASA's Information Technology Infrastructure Integration Program (I3P) and as such is part of an Agency strategy to move from a Center-centric to an enterprise model of providing IT services.[2] NASA established I3P in 2007 with the goals of enabling Agency-wide collaboration through a seamless IT infrastructure; realizing efficiencies in IT infrastructure operating costs; reducing the complexity of managing IT services; and improving IT security. To accomplish these objectives, the I3P program sought to identify IT infrastructure services common to all NASA Centers, consolidate those services into fewer contracts, and manage them from a centralized service office.

[2] The other three contracts that make up NASA's IP3 effort are: the Web Enterprises Services and Technology contract, which provides an Agency-wide capability to create, maintain, and manage websites; the NASA Integrated Communications Services contract, which consolidates the NASA Integrated Services Network wide area and Center local area networks and services; and the Enterprise Applications Service Technologies contract, supporting the NASA Enterprise Applications Competency Center to deliver enterprise application services.

In December 2010, NASA awarded the ACES contract to HP to provide, manage, secure, and maintain the bulk of NASA's personal computing hardware, standard software, mobile IT services (including smartphones), and associated end-user services. Under the contract, HP provides both "computing seats" and base services. Computing seats include hardware (e.g., desktop computer, laptop, operating system, monitor, and docking station) and services (e.g., software and system administration). Base services include e-mail and calendaring, user authentication, security patching, encryption, "loaner pool" equipment management, instant messaging services, and a "help desk" to respond to customer questions and computer problems.

NASA pays HP a fixed price for each computer seat and additional amounts for base services based on the estimated number of Agency employees.[3] Unlike the ODIN contract under which Centers paid for their delivery orders, the ACES contract requires Centers to pay into a common working capital fund managed by the I3P Business Office located at the NASA Shared Services Center (NSSC).[4] From contract inception through August 2013, NASA has paid HP $169 million – $93 million for seat services, $51 million for base services, and $25 million for contract adjustments such as infrastructure upgrades, IT hardware, and software made via Infrastructure Upgrade Proposals (IUP) and catalog purchases.[5]

In an effort to promote high quality service and customer satisfaction, NASA established a series of performance metrics in the contract that affect HP's compensation. Specifically, NASA may retain up to 16 percent of the amount HP invoices monthly if the company fails to meet agreed-upon metrics in areas such as customer satisfaction, incident reporting, adherence to schedule, and subcontracting goals.[6]

As part of the ACES base contract, HP planned to replace all existing ODIN equipment with HP equipment within the first 6 months of contract execution. However, for a variety of reasons, this did not occur and instead HP purchased the existing computer equipment from Lockheed Martin. Many of the significant issues and delays surrounding the ACES contract relating to inventory, billing, and security are traceable to this deviation from the original contract. Moreover, NASA cannot accurately measure the true cost of the ACES contract nor determine whether it has resulted in savings compared to the ODIN contract because the Agency is incurring additional costs beyond the base and seat charges that affect the total cost of IT services. For example, HP has submitted

[3] According to the ACES contract, NASA's N2 database, the system that contains the total estimated number of civil service and contractor employees at each Center, is used to determine this figure.

[4] The NASA Shared Services Center is a partnership between NASA and a contractor that consolidates support functions such as financial management, human resources, IT, and procurement.

[5] The ACES contract provides NASA with two options for ordering services and supplies: (1) Enterprise Service Request System (ESRS) or (2) IUPs. Because ESRS can only be used for individual orders, IUPs are used when supplies and services are needed for multiple users or for items not included in the ACES contract.

[6] A complete list of the metrics appears on pages 10 and 11 of this memorandum.

two claims demanding several million dollars for services provided in excess of contract requirements and disputing amounts NASA has retained based on the company's failure to meet performance metrics. These types of issues, along with a high level of turnover and staffing shortages at both HP and NASA, have increased tensions, burdened the working relationship, and diminished trust between HP and NASA.

The OIG assessed the current state of the contract against the backdrop of these challenges, concerns we heard from NASA managers, and the critical decision about the future of the ACES contract the Agency Chief Information Officer (CIO) will soon need to make. To obtain a broad perspective, we interviewed ACES stakeholders across the Agency including the Agency CIO, several Center CIOs, representatives from the End-User Service Office, ACES Subject Matter Experts, HP representatives, a NASA Program Support Manager, procurement representatives, ACES Contracting Officers, Contracting Officer Technical Representatives, and members of the ACES Source Evaluation Board.[7] We also reviewed the base contract, contract modifications, and other documentation relevant to the contract.

NASA Not Prepared for an Enterprise Approach

NASA did not establish and continues to lack the necessary governance structure to successfully implement an Agency-wide IT solution. NASA's current IT governance structure is overly complex and ineffective and, in our opinion, not well positioned to manage an enterprise-wide IT environment encompassing more than 50,000 federal employees and contractors. The ACES contract describes NASA as a singular "enterprise" when from a technical and practical standpoint it is not. Functionally, NASA does not operate as a single enterprise, but rather as 10 different enterprises as reflected in the relatively autonomous operating nature of its Centers. With implementation of the ACES contract, NASA moved from a Center-centric IT model to an enterprise model without fully considering the technical challenges of such a dramatic change. As one example, Center IT representatives told us that HP did not coordinate with Agency personnel to adjust firewall rules to allow for the shift from Center-operated to enterprise-wide deployment and management. Without this critical coordination, implementation of the contract was further delayed. In addition, IT representatives noted that requests previously addressed by Center-based ODIN personnel are now routed through the centralized ACES end-user services office. In their view, this more cumbersome process results in delays. Further, NASA IT managers failed to commit sufficient resources to execute an enterprise-wide approach. Notwithstanding enthusiasm for an enterprise model among some NASA IT representatives, most agreed that the funding and staffing applied to the transition were not adequate to ensure a smooth transition.

[7] The End-User Service Office (EUSO) is responsible for providing service management and oversight for Agency end-user services. EUSO staff manage technical operations with oversight from the Marshall Space Flight Center CIO in collaboration with the enterprise level Service Executive. NASA Centers have named subject matter experts to monitor day-to-day contractor activity and be familiar with contract requirements. Both EUSO staff and subject matter experts are responsible for providing input used to evaluate HP's performance.

NASA's culture also affects its ability to implement an Agency-wide IT services model. As noted in our 2013 IT Governance report, the Agency's history and organizational structure hinders the CIO's ability to implement and enforce sound IT governance initiatives. Moreover, the CIO has limited visibility and control over a majority of NASA's approximate $1.5 billion in annual IT investments. For example, each NASA Center employs its own CIO and IT staff, and the Agency CIO has delegated to the Center CIOs the responsibility, authority, and accountability for Center IT portfolios. Given this structure, it is not surprising that a move to an enterprise model encountered resistance. Indeed, HP officials told us that after awarding the ACES contract, NASA's former CIO tasked them with "selling" the enterprise model to Center personnel.

Complicating matters further, NASA's decision-making process under the ACES contract is highly bureaucratic and disseminated throughout multiple levels of Agency management, including the Contracting Officer, the End-User Services Office, Center representatives, the IT Management Board, and the Agency CIO. According to HP representatives, this has complicated nearly every aspect of the contract because of the length of time it takes to obtain agreement from all parties. Additionally, HP representatives stated that at times NASA required top Agency managers to be consulted and in agreement on basic decisions concerning the contract, which contributed to inefficiencies. Moreover, we found that decisions that should be made at the Agency-level are instead being made at individual Centers, sometimes with different outcomes. For example, decisions regarding whether each Center must provide HP employees with workspace and who is responsible for scheduling technical refreshes have been left at the Center-level, leading to inconsistent guidance to HP.

We also found that satisfaction with the ACES contract and HP varied widely from Center to Center, with the level of satisfaction often related to the relationships formed between HP and NASA personnel at each location. This finding is similar to results of our 2013 IT Governance report in which we found that NASA IT representatives tend to rely on informal relationships rather than formalized business processes when managing Agency IT resources.

Further complicating implementation of an Agency-wide IT model is the lack of a fully mature enterprise architecture. The purpose of an enterprise architecture is to ensure that business strategies and IT investments are aligned with and support an organization's strategic plan. At NASA, the Enterprise Architecture Office within the OCIO is responsible for articulating the Agency's mission supporting technologies and operational model to accomplish the Agency's IT goals. The Enterprise Architecture Office assesses the Agency's current IT architecture and determines an approach to move from the "As-Is" state to the "To-Be" state. However, these plans were not in place prior to the implementation of the ACES contract, leading to inconsistent deployments across the Agency. Several NASA IT representatives told us that going forward the Agency should establish strict guidelines to identify requirements that are truly unique to the individual Centers. Further, several NASA IT officials suggested that the Agency needs to establish a comprehensive IT foundation before an enterprise-based IT solution could be

successful. Many of these IT officials also said that integration of all the I3P contracts, including ACES, is weak and incomplete. In fact, an August 2013 review of the I3P program by NASA officials recommended that NASA either reaffirm its commitment to the program by providing adequate resources to accomplish its objective, de-scope its objective to make it an executable program, or abandon the enterprise approach for delivery of IT services.[8]

Source Evaluation Board. NASA managers we spoke with expressed concerns that some of the issues encountered with the ACES contract can be traced to weaknesses in the Agency's request for proposal (RFP), the Source Evaluation Board (SEB) methodology, and the staffing and process used to draft the contract.[9] The SEB – composed of NASA civil servants from a variety of Centers – was charged with assisting the Source Selection Authority by providing expert analyses of the proposals from prospective contractors. Although the SEB's operations were based at the NSSC, not all of the Board members were located there. Several SEB members worked at other NASA Centers and had to travel to the NSSC for weeks at a time to perform board functions. These members were not specifically dedicated to the contractor selection process and would often return to their home Center to perform their normal duties. Some NASA officials also questioned whether SEB members from the Centers had the ability to view the prospective contract from an Agency-wide perspective as opposed to a Center-specific viewpoint. Center representatives who were not SEB members expressed concern that while they had an opportunity to review parts of the RFP and contract, the SEB was not staffed to handle their feedback and many issues were left unaddressed by the Board. Additionally, many officials we spoke with said the RFP was not fully representative of the state of NASA's IT environment and that HP did not perform sufficient due diligence in preparing its proposal.

At the conclusion of their SEB duties, several Board members transitioned into positions responsible for administering the ACES contract. This appears to have contributed to disagreement between HP and NASA personnel regarding the terms of the contract and further stressed the working relationship between the two groups. For example, HP officials told us they believe the Agency is asking them to undertake tasks not required by the contract and therefore the company is charging NASA and submitting invoices when it performs these services. On the other hand, many NASA officials expressed the view that HP should be more flexible regarding contract interpretation and show a greater commitment to improving customer service.

Lessons Learned. During our review, NASA managers, IT representatives, and procurement personnel shared their experiences relating to the transition from a Center-based to an enterprise-level IT approach, including several "lessons learned":

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[8] I3P Assessment Team, "I3P Assessment Team: Final Report" (August 14, 2013).

[9] The SEB is a group of government civilian personnel representing functional and technical disciplines charged with evaluating contractor proposals and developing summary facts and findings. The SEB assists the Source Selection Authority by providing expert analyses of the proposals in relation to the evaluation factors contained in the solicitation.

- Consider as a threshold matter whether NASA's IT environment is sufficiently homogenous and mature to implement an Agency-wide IT solution.
- Ensure adequate staffing and funding are available to support Agency-wide IT initiatives.
- Establish standardized end-user IT processes across the Agency and designate the appropriate decision making authorities.
- Establish guidelines to help identify requirements that are truly unique to individual Centers.
- Determine the Agency's commitment to the overall I3P initiative.
- Include a thorough and complete representation of NASA's IT environment in any future RFPs.
- Ensure personnel involved in the RFP process and SEB members have the skill sets necessary to handle feedback and concerns of Centers and Mission Directorates.
- Ensure SEB members are provided the appropriate time to perform their evaluation duties.
- Review whether it is appropriate for members of the RFP team or SEB to administer the resulting contract.
- Establish a single group to perform Agency-wide IT implementation to ensure consistency and leverage lessons learned during implementation.

Contract Not Meeting Agency Goals

The ACES contract has faced significant challenges from the outset. Not only was the enterprise-wide approach a radical change for NASA, but HP was unfamiliar with NASA's IT environment and culture. Additionally, the OCIO had limited experience developing and awarding an enterprise-wide IT contract and failed to adequately prepare for the difficulties entailed in consolidating the heterogeneous, Center-specific IT services previously provided under the ODIN contract into a single, Agency-wide IT services program.[10]

Technology Refresh. In its proposal, HP promised to replace all existing ODIN laptop and desktop computers with new HP equipment – known as a technology refresh – within 6 months of contract award, and this provision was incorporated into the ACES contract. However, HP was unable to deliver on this promise. According to Agency IT officials, this occurred because HP did not have a good understanding of NASA's IT environment and did not perform sufficient due diligence to identify the issues the company would face during contract implementation. On the other hand, HP representatives attributed

[10] Upon award of the contract to HP in December 2010, Lockheed Martin Corporation, the incumbent contractor, filed a protest claiming that NASA's evaluation of proposals and its selection process was unreasonable. The Government Accountability Office denied Lockheed Martin's claim in April 2011, but the protest delayed the start of the ACES contract for 4 months.

the delay in refreshing equipment to inefficient decision making by the OCIO on hardware specifications for new computers and NASA's inability to develop a functioning ordering system for new IT equipment.[11] Whatever the exact causes, HP's plan changed from a complete refresh of all NASA computers within the first 6 months to a phased replacement approach that will not be complete until April 2014.

This early failure significantly affected the success and acceptance of the ACES contract. According to the original contract, "the successful phase-in of ACES seats would establish the foundation for IT services management and the achievement of ACES goals and objectives as well as setting the tone for end-user service delivery throughout the Agency." The contract further stated that HP would execute a seamless phase-in of products and services from ODIN to ACES and provide users with an immediate technology refresh of computing services capabilities. According to HP, the refresh was the foundation for achieving NASA's goals for ACES and underpinned HP's strategy to save NASA more than 40 percent compared to the previous contractor, establish a single stable IT security environment, and enable the introduction of new technology early in its tenure as NASA's new contractor for end-user services.

Once HP realized it could not accomplish the full technology refresh in the timeframe it had promised, it purchased the computers, laptops, and other IT assets from Lockheed Martin for approximately $27 million. However, a complete and accurate inventory of ODIN assets was not available, and consequently HP had little assurance of exactly what equipment it had purchased. In addition, purchasing ODIN equipment left many NASA employees and contractors with computers not equipped with features specified in the ACES contract. For example, the ACES contract required the refreshed computers be equipped with encryption software that most legacy equipment lacked. The subsequent theft of a laptop computer from a NASA employee containing sensitive information in October 2012 prompted NASA IT officials to devote significant time and money to expediting the deployment of encryption software on Agency computers. In the end, NASA paid HP an additional $220,538 to undertake the hurried encryption effort – a task and expense that would have been unnecessary had HP met its original requirement to refresh all of the ODIN equipment with new, encrypted machines within the first 6 months of the contract. More than 2 years into the ACES contract, HP has yet to complete a total hardware refresh; specifically, more than 9,000 of approximately 44,000 computers have yet to be refreshed as of September 2013.

Contract Modification 48. NASA uses performance metrics to assess HP's progress in meeting contract objectives and goals. Early in the implementation of the ACES contract, NASA deemed HP "failing" in the areas of service delivery and incident management and characterized customer satisfaction as inconsistent. According to the

[11] Once it became clear that HP would be unable to meet its contractual requirement to deliver a complete refresh in 6 months, the former Agency CIO needed to decide whether to continue working with HP or recommend terminating the ACES contract. According to several Agency IT officials, NASA decided against termination because the Agency had neither the funding nor the desire to extend the ODIN contract and the former NASA CIO was confident that HP could deliver on its other contract requirements.

I3P Program Manager at the time, all HP's metrics were indicating failure because HP was not providing the products and services specified in the contract. In response to these issues, in April 2012, NASA and HP signed contract modification 48, which fundamentally changed many of the requirements of the original contract, including the phase-in-plan, deployment schedule, and performance metrics. In addition, HP agreed to provide NASA monthly credits or discounts to its base services and seat service charges up to $15 million. We summarize the major contract changes resulting from modification 48 below:

- *Performance Metrics and Retainage Pools*. Changed the performance metric categories and the calculation approach and added a retainage pool schedule, or the amount NASA may withhold from HP based on failure to meet performance metrics. NASA increased the amount it can withhold from 12 to 19 percent in order to incentivize HP to improve service delivery.
- *Phase-In Plan*. Adjusted the transition approach to include HP's purchase of existing ODIN assets and support of those assets until HP refreshes the seats. The updated phase-in plan describes HP's plan to deploy new ACES equipment and its approach for completing the ACES transition.
- *Management Plan*. Revised HP's Management Plan and replaced several key members of the ACES management team.

Performance Metrics. NASA assesses HP's performance via service level agreements that outline the level, scope, and quality of a service; the way in which NASA measures the service; and the penalty for inadequate performance (retainage). Service level agreement categories include such areas as service delivery, customer satisfaction, incident management, and adherence to the equipment refresh schedule. Throughout the first 2 years of the contract, NASA has struggled to develop sound performance measures to evaluate HP's performance. As noted previously, NASA changed the original metrics in April 2012 with contract modification 48 after HP failed to complete the refresh in the promised 6 months. A second revision to this criteria occurred in October 2013 when NASA agreed to make changes to the performance metrics in response to a claim by HP related to performance calculations and retainage amounts. In January 2014, NASA rewrote the performance metrics for a third time.

Since contract inception, NASA has retained approximately $6.9 million from HP for inadequate performance related to the contract service level agreements. HP's performance is measured using four retainage pools and their associated service level agreements:

- *Metrics Retainage Pool* is calculated monthly and is comprised of 8 percent of the total monthly costs allocated between seven areas: (1) Service Delivery, (2) Service Availability Non-Base Services, (3) Service Availability Base Services, (4) Customer Satisfaction, (5) Security Management Services, (6) Incident Management, and (7) Service Asset Management Effectiveness.

- *Performance Retainage Pool* is assessed quarterly and is comprised of a retainage at risk amount of 2 percent per month or 6 percent for each quarterly review period.
- *Schedule Retainage Pool* is calculated monthly and is comprised of 5 percent of the total monthly costs allocated between two areas: (1) Legacy Refresh Schedule Adherence and (2) Contract Compliance Schedule. Review and evaluation of these metrics will continue through the end of the initial ACES computer seat deployment or completion of the ACES technical services, whichever is later.
- *Small Business Utilization Pool* is comprised of 1 percent of the contractor's net monthly invoice and is evaluated against originally proposed Contractor Subcontracting Plan goals.

HP is required to submit monthly reports to NASA identifying its performance against the established metrics. NASA uses these reports along with the personal observations and assessments of NASA staff to evaluate HP's performance. Several Agency IT representatives expressed concern that NASA is placing too much reliance on HP's data to measure the company's performance. Further, many Agency IT representatives told us that even though HP is generally meeting most performance metrics, a significant number of users remain unsatisfied, leading the representatives to question whether NASA is incentivizing the right behavior. While NASA intended to design the contract's performance metrics and retainage pools to promote excellent service delivery and customer satisfaction, Agency officials did not accurately foresee the resources necessary to monitor and evaluate contractor performance in a process many IT representatives describe as overly burdensome.

ACES Product Catalog. The ACES contract requires HP to provide a web-based catalog of commercial IT products not included as part of base services. Using this catalog, employees can place orders, check order status, resolve disputed orders, schedule delivery and installation, and return equipment. The contract states that HP shall offer hardware and software prices at a 30 percent discount below the manufacturer's suggested retail price. However, we found that the product catalog is limited and equipment and software is often unavailable. According to NASA managers, HP's shrinking profit margins are driving product availability and HP has removed items from the catalog. According to the contract, NASA can direct HP to add or remove catalog items. However, for approximately 4 months in 2013, HP removed all software from the catalog without Agency permission, which led users to make IT purchases elsewhere. Several IT managers told us that users at their Centers are placing orders using alternate procurement vehicles and as a result NASA is not realizing the efficiencies and cost savings initially envisioned with the ACES contract.

Lack of a Complete Ordering System. NASA does not have a fully functional system to order ACES-provided equipment and services. The ACES contract states that NASA will place all orders through either the Enterprise Service Request System (ESRS) or the

Infrastructure Upgrade Ordering Process.[12] NASA planned for the ESRS to provide users with a single automated tool to place orders for end-user services and catalog purchases. However, NASA included a statement in the "Ordering of Services and Supplies" section of the contract noting that ESRS was still under development:

> **Note to Offerors:** The ESRS is being developed concurrently by the NASA Shared Services Center (NSSC) and Computer Sciences Corporation (CSC) under contract NNX05AA01C. As development of the ESRS matures, this clause will be revised to provide more comprehensive information on the system.

Nearly 2 years later, NASA still has not developed a complete and fully functional ordering system. While NASA uses ESRS to place single orders, the system cannot process bulk orders and no automated integration exists between NASA's ordering system and HP's order fulfillment and asset tracking system. Consequently, the Agency submits bulk orders using spreadsheets, which HP personnel manually enter into their services and asset management systems.

The absence of a fully functional ordering system has affected HP's ability to deliver equipment and services. For example, the contract states that HP will refresh mobile devices such as smartphones every 18 months. However, because the ordering system has no mechanism for NASA managers to approve employee mobile device purchases or upgrades, these devices are not being replaced on schedule. As a workaround, NASA and HP have agreed to upgrades that do not involve additional service charges and are strictly technology upgrades for the same service ordered, such as upgrading from an iPhone 4 to an iPhone 5. Further, HP proposed adding an additional fee of $104 per technical refresh to cover the cost of manually processing bulk orders. NASA has rejected this fee proposal and, according to OCIO officials, is focusing on resolving issues jointly with HP.

In addition to the incomplete ESRS ordering system, the Computer Sciences Corporation (CSC) is also responsible for developing the Configuration Management Database to be used to identify, maintain, track, and report on all ACES-managed equipment. However, like the ESRS, the database is not fully functional. The requirements for developing both systems were added to an existing service delivery contract between CSC and the NSSC. However, because CSC receives its direction from the NSSC Board of Directors rather than the OCIO, the OCIO has limited authority over CSC and does not direct its activities.[13] Some NASA IT managers believe that the ordering and tracking systems are not complete because of competing priorities and a struggle for funding and resources between the NSSC and the OCIO. Assigning the design and development of both the ordering system and asset control systems to a service delivery contract outside the control of the OCIO has not worked well, and to date neither system is complete or functioning as intended.

[12] ESRS is an integrated management tool designed to be used by all I3P Contractors to coordinate and fulfill service requests.

[13] CSC is an NSSC support contractor.

Incomplete Inventory and Inaccurate Invoices. NASA does not have an accurate database to track the services and associated equipment ordered through the ACES contract. According to the contract, HP is required to maintain configuration control for the ACES-managed/provided IT environment and update NASA's tracking database with current information after receiving, installing, refreshing, excessing, or moving items. While the database was designed to be NASA's authoritative record for validating ACES services and invoices, NASA managers said the ordering system and database are not integrated and the information in the database is not accurate, two factors that significantly hinder NASA's ability to validate ACES services and invoices. Currently, a cumbersome multi-step process is used to populate the database with IT asset information. Specifically, HP extracts the information from its asset tracking system into a spreadsheet that NASA personnel load into the database. Agency officials informed us that this manual process is error prone and time consuming. Further complicating NASA's ability to maintain an accurate inventory is the presence of unreliable information in the database regarding legacy ODIN equipment. When HP purchased the ODIN assets, the inventory was outdated and incomplete. However, this admittedly inaccurate data was relied upon to determine the refresh schedule and to produce invoices for NASA. Although NASA and HP are currently working to correct the data, this task will require substantial resources and tremendous effort.

While an interface with the vendor is necessary to gather asset information for deployed seats, we question why NASA does not maintain its own inventory of assets in order to verify the accuracy of the invoices it receives from HP. During our review, we identified several reoccurring issues with ACES invoices, including: (1) IT equipment or mobile devices assigned to the wrong employee, the wrong Center, or both; (2) invoices with incorrect installation dates; and (3) invoice errors being corrected one month but reappearing the next. We also noted that NASA Centers and Programs are expending a great deal of internal and contractor resources to verify monthly invoices.

Without an accurate inventory, NASA cannot be sure it is paying the correct amount for each ACES seat. To determine the amount of money potentially at risk, we averaged the cost of the standard computer seat or "S" available to all NASA employees for a Windows and Apple desktop and laptop during the first 3 years of the contract. Because the cost per seat can vary, we used the lowest cost for each device in our calculations. We then determined the average price NASA will pay for the computer seat based on an expected 3-year useful life of the equipment. We calculated that NASA pays between $2,300-4,000 to order an "S" seat from HPES for 3 years. Even with the substantial resources devoted each month to reconciling HP invoices, almost 2 years into the contract NASA has little assurance the amount it pays HP is correct.

Table 1. ACES Cost Per Seat

Equipment	Average Cost Per Device Per Month	Average 3 Year Service Cost
Microsoft Desktop	$65.11	$2,343.96
Microsoft Laptop	78.93	2,841.48
Apple Desktop	101.42	3,651.12
Apple Laptop	111.36	4,008.96

Source: OIG analysis of ACES contract data.

The cost-per-seat listed in Table 1 is for the standard computing seat. However, the contract provides that HP will also provide three other types of seats : the "M" seat with pre-defined services and services that can be modified by the end-user; the "B" seat for which services are "built" to specific end-user requirements and service options; and the "T" seat for which services are rendered through a thin client appliance with predefined services and service options.[14] According to NASA IT officials, "B" seats are currently very limited and HP has yet to deliver any "T" seats.

Security and Patch Management. In addition to billing issues, the lack of an accurate and complete inventory poses a significant risk to NASA's IT security. According to the SANS Institute, a leading research and education organization of IT security professionals, the top security control for effective cyber defense is an "inventory of authorized and unauthorized devices." In other words, to secure its network an organization must know what equipment is connected to that network. Accordingly, the lack of a complete and accurate inventory poses an ongoing security challenge for NASA.

In addition, NASA's Security Operations Center – the entity that provides centralized, continuous monitoring of the Agency's computer network traffic as well as the coordination, tracking, and reporting of security incidents – reported in September 2013 that ACES failed to deploy multiple updates, such as security patches, in a timely manner, with some updates several months overdue. Patch management is the practice of installing software designed to fix problems or update a computer program and its supporting data. Because these patches are critical to proactively prevent the exploitation of vulnerabilities on IT devices and ensure the security of NASA's networks, it is crucial they be timely installed. However, NASA IT officials told us that patch management of ACES computers needed improvement. Many cited the requirement of end-user interaction and the delay in installing patches as two of the more crucial IT security issues. Because patches are only installed on machines during business hours, many users do not interrupt their workflow to install the necessary patch, leaving their computers susceptible to vulnerabilities. To address this issue, HP recently adjusted the patch schedule to occur at night. However, because computers must be powered on and connected to the NASA network to receive the patches, user interaction is still required.

[14] "Service Option" is the characteristics and metrics that define a particular type of support to be provided by the contractor. A thin client appliance refers to either a software program or an actual computer that relies heavily on another computer to do most of its work.

Data Management. We are concerned that NASA data stored on ACES computers may not be adequately safeguarded at the end of the machines' useful lives. NASA does not own the ACES equipment and returns it to HP when no longer needed. As part of this process, the contract requires HP to provide "Wipe and Load" services for ACES seats. Wiping is the act of erasing all information on computer hard drives and bringing the seat back to the current, fully functional baseline configuration. HP relies on one subcontractor to collect devices and another to wipe the hard drives. According to the ACES Subject Matter Experts we spoke with, there is little accountability and weak internal controls when the computers are collected for Wipe and Load services. For example, many users do not receive a receipt for removed equipment and the equipment often continues to appear as "active" in the ACES inventory. Once the computers are collected, the subcontractor loads them into vehicles (sometimes the personal vehicles of subcontractor staff) and the computers leave NASA control to travel to another subcontractor for hard drive wiping. In many cases, this equipment – potentially containing large amounts of NASA data – travels hundreds of miles from the NASA Center to the subcontractor's location before the hard drives are sanitized.

Staffing. Both NASA and HP have experienced extensive turnover of key IT, procurement, and other staff involved in the daily administration of the ACES contract. Moreover, NASA relies on a single contracting officer at the NSSC to administer the ACES contract and accomplish the tasks multiple contracting officers performed for the ODIN contract. During the first 2 years of the ACES contract, the project has had four contracting officers and five contracting officer technical representatives.[15] Several people involved in administering the ACES contract raised concerns that the contracting officer is located at the NSSC while the contracting officer technical representative works out of the End-User Service Office at the Marshall Space Flight Center. NASA has also experienced turnover in the ACES End-User Services Office and among Center IT personnel dedicated to implementing the contract. On the HP side, company officials acknowledge they did not appropriately staff the transition from ODIN to ACES and that they have experienced high staff turnover at the Centers.

A September 2013 study by the OCIO found that lack of skills and limited knowledge of HP Center technicians was leading to inefficient processes, a lack of confidence by customers, and an increase in customer dissatisfaction. Additionally, an HP representative told us that subcontractors at NASA Headquarters walked off the job over a dispute regarding how they were paid for installing new equipment. Specifically, they were being paid based on the number of computers installed – installations they could not complete if NASA users turned them away. HP representatives estimated that at the time employees were denying approximately 40 percent of planned refreshes at Goddard Space Flight Center. NASA IT managers said some of the users refused equipment either because they did not order it or because it was wrong equipment. To address this issue, NASA and HP are instituting a $100 per seat charge to the party at fault for any installation missed four or more times. We are concerned that these staffing issues affect the quality and consistency of service delivery.

[15] A contracting officer's technical representative assists in the technical monitoring and administration of a contract.

We are also concerned about the safety of NASA-leased equipment and information if subcontractors with access to this property have not completed proper background checks. Specifically, we identified several HP subcontractors working at NASA Centers who had criminal histories related to theft and child pornography – issues that should have been flagged with appropriate background screenings.

Cost Savings. NASA estimates that had the ACES contract been implemented as planned, the Agency would have saved approximately $31 million a year compared to the ODIN contract. However, because of the many modifications to the contract and the lack of a complete ACES inventory, NASA cannot accurately measure the true cost of the ACES contract or determine whether it has resulted in any savings to the Agency. In addition to the indirect cost related to validating ACES invoices, staff turnover, and the civil service resources devoted to the contract activities, NASA is incurring additional costs beyond the base and seat charges that may affect the total cost of the contract. For example, among the claims submitted by HP for additional payments from NASA are charges for $12.9 million in June 2013 for services the company believes it provided in excess of contract requirements and $5.4 million in July 2013 disputing performance calculations and subsequent payment retainage. NASA settled the latter claim in the fall of 2013. Furthermore, as previously mentioned NASA paid HP an additional $220,000 between July 2012 and March 2013 to expedite encryption on laptops computers.

NASA continues to modify the contract to address gaps and request additional services that result in additional charges. Of the 200-plus contract modifications, 128 were for IUPs. NASA uses IUPs to request a variety of services such as a dedicated ACES technician for a specific NASA program or a Center paying for an early technical refresh. As of November 2013, NASA has negotiated $31.6 million in IUPs with HP. In the 2 years since its inception, NASA has made over 200 contract modifications to the ACES contract. In our opinion, the high number of modifications in such a relatively short period indicates that the contract was not specific enough to meet the needs of NASA's decentralized IT environment and that the services provided to date are not meeting NASA's expectations.

Lessons Learned. During our review, ACES stakeholders, including HP representatives and NASA IT and procurement officials, shared with us the issues, risks, and lessons learned they have encountered during development and implementation of the ACES contract, including:

- Ensure Agency requirements are clearly defined in a complete, concise, and realistic contract.
- Consider mechanisms or options available to the Agency to enforce contract requirements that are not met.
- Review performance metrics to ensure they promote the intended outcome and ensure that NASA has a viable means to measure the contractor's performance, including allocating sufficient staff with adequate time to spend on the project.

- Address the barriers hindering development of a fully functional ordering system or explore alternative solutions.
- Establish an inventory of services and assets in order to verify the accuracy of invoices and ensure proper security and patching of devices.
- Consider reviewing current data management practices.
- Ensure identification of the proper resources, such as staffing, technical skills, and management to execute contract requirements.

Management Action

NASA is fast approaching a crossroads related to the ACES contract and soon must decide whether to execute the first 3-year option period or begin a lengthy and labor-intensive effort to identify alternates to obtain its critical IT services. Prior to making this decision, we encourage NASA to consider the information contained in this memorandum in addition to its own reviews, feedback from customers and stakeholders, and estimates of its projected future funding levels.

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