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TECHNICAL
REPORT

CANES Contracting Strategies for Full Deployment

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Summary

The Consolidated Afloat Networks and Enterprise Services (CANES) program seeks to consolidate disparate computing networks. The program has a rigorous fielding and upgrade schedule to replace the legacy systems of the fleet. If successful, the program will give the Navy a common set of key command, control, communications, computers, and intelligence (C4I) networks across the fleet, reducing costs and minimizing obsolescence issues. Successful implementation of CANES will also represent a major step toward creating a Program Executive Office (PEO) organization that is "horizontal," data-centric, and able to rely on a service-oriented architecture for success.

While developing the software required for CANES, the Navy let two contracts for developing the Common Computing Environment (CCE) to be used with CANES. Under these contracts, contractors will design CANES, identifying specific hardware and developing the integration software necessary to consolidate existing C4I functions. At the time this research was conducted, the Navy expected that a down-select would occur in late spring 2011. After this point, a single contractor would become responsible for producing the CANES design, refining integration software, and assembling and testing the system in 2012 in the limited deployment (LD) phrase. The program office anticipated that a full deployment (FD) contract would be awarded in spring 2012. The successful contractor would be responsible for executing the purchased design and assembling the systems, ensuring that the integration software is functioning. An important assumption being made by the program office is that the designs produced during system development will be build-to-print designs based on the system configuration developed during system design and development (SDD) and tested and refined during LD.[1] The expectation is that the CANES program will then be able to leverage a much broader production base for contracting during the FD phase of the program. The Navy must also determine acquisition and supporting contracting strategies for the FD phase. The objective of this research is to identify which contracting option for the FD phase of the CANES program will best support the Navy's program priorities and objectives.

This report identifies and assesses five potential contract strategies for the FD phase of the CANES program. We focus primarily on initial fielding, which is expected to take approximately six years. (Our examination of other programs reveals that the acquisition and contracting strategy can evolve to fit the needs of the program as it matures.) The potential strategies we identified are based on our understanding of the program goals and risks that we derived from

[1] The term *build-to-print* refers to materials received by the government from the contractor that include the design of the system, identification of hardware components, information on how to assemble the hardware, data rights to the software code, and instructions on how to load and run required integration software.

interviews with program staff and from our review of all of the available program documentation. The strategies were also informed by lessons learned from similar programs we studied.

Potential Strategies

We developed five procurement approaches for the CANES program. Our governing principles for developing the approaches were that they had to (1) be flexible enough to accommodate the known and unknown risks, (2) provide a broad range of strategies, and (3) provide best value in terms of price and quality.

The first option we developed would maximize work to be done by a single prime contractor. We also considered the opposite option, maximizing work to be done by the government. The other three options allocate specific functions to varying contractors under multiple award contracts (MACs) using an indefinite delivery, indefinite quantity (IDIQ) format for production and installation. Table S.1 shows the five options and the primary functions that need to be performed during the FD phase of the program.

Single Prime Contractor

Our first option, maximizing work for a single prime contractor, is the most commonly used acquisition model in the Department of Defense for large acquisition programs. In this model, the Navy employs a single contractor (in Table S.1, the "prime") to be responsible for program performance. This minimizes the need for multiple contractor coordination and the need for

Table S.1
Procurement Options for the Full Deployment Phase

	Option				
Function	**Single Prime Contractor**	**Multiple Contract Model A**	**Multiple Contract Model B**	**Multiple Contract Model C**	**Government**
Design and integration Technical advice Systems engineering Configuration management In-service support	Prime	Contractor A	Contractor A	Contractor A	Government
Production	Prime	Winners of production MAC IDIQ (not Contractor A)	Winners of production MAC IDIQ (not Contractor A)	Winners of production MAC IDIQ (not Contractor A)	Government plus winners of existing service center MACs
Installation	Prime	IMO	Winners of installation MAC IDIQ (not Contractor A or the winners of the production MAC IDIQ)	Winners of production MAC IDIQ (not Contractor A)	IMO

NOTES: IDIQ = indefinite delivery, indefinite quantity. IMO = Installation Management Office. MAC = multiple-award contract.

government-furnished equipment (GFE) as well as technical risks by using consistent standards and communication protocols.

There are, however, disadvantages to this approach. Once the contract is awarded, the government can do little to address subsequent cost and performance problems.[2] This model also requires new processes and agreements with installation activities. Much of the dollar value of such contracts is negotiated on a sole-source basis with the prime contractor after contract award, when the government has minimum leverage to obtain best value. Finally, this model requires extensive Navy effort to negotiate many task orders, delivery orders, and contract changes in a sole-source environment.

Multiple Contract Model A

Model A uses one contractor (in Table S.1, "Contractor A") to conduct the necessary technical and engineering effort, including design and integration. The contract can be competitively awarded but needs to cover a number of fiscal years to ensure continuity and avoid disruptive and costly contractor turnover. Assuming acceptable contractor performance, it is a good idea to maintain this contractor for the duration of the program. Production is carried out by other contractors that receive periodic awards of delivery orders under MACs using an IDIQ format. The installation is handled by Space and Naval Warfare Systems Command's (SPAWAR's) existing Installation Management Office (IMO) process. This option allows Contractor A to perform all engineering functions and to maintain continuous experience for a long period, thereby minimizing cost and risk. Contractor A would, of course, be able to subcontract various functions. This model also allows periodic competition for production of ship sets, thereby securing the best and most current hardware pricing and eliminating the risks associated with using new organizations, processes, and contractors for installation. This alternative also, however, requires multicontractor coordination and the provision of GFE and government-furnished information (GFI). This may make it more difficult to negotiate contract changes and to hold contractors responsible for their performance.

Multiple Contract Model B

This approach has many of the same characteristics and advantages as Model A. It adds periodic competitions for installation, which has the advantage of keeping the pressure on installation contractors to improve cost. This approach has the same disadvantages as Model A and additional disadvantages in its requirements for (1) extra government effort to set up and administer two sets of MAC contracts and (2) new processes and agreements for coordinating the installations. This model may also require modifications to Navy and SPAWAR policy.[3]

Multiple Contract Model C

Model C uses one set of MAC IDIQ contracts to combine CANES production and installation. This approach has all of the advantages of Model B, as well as the advantage of holding one contractor responsible for each ship. It also has all of the disadvantages of Model B plus a

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2 Changing the prime contractor once it has been selected is expensive. Furthermore, penalizing the prime contractor for poor performance is an ineffective means to improve performance.

3 See SPAWAR, 2006. Current policy states that all installations must be managed through the Installation Management Office.

greater likelihood that the IDIQ awards will exceed $10 million, thereby permitting MAC bid protests under the Federal Acquisition Regulation (FAR).

Government Option

Under this approach, the technical and engineering functions are assigned to SPAWAR's Systems Centers (SSCs). The government would procure information technology hardware using existing MACs and assemble and wire them into racks at the SSCs. The IMO would handle the installation using the existing ship installation process. This option has the advantage of minimizing contract actions, using existing installation processes, and giving the program office excellent oversight of performance. There are disadvantages, however. This is an unconventional acquisition model for such a large program. There is a perception that, because the program office has so few tools to ensure good performance, the government would not be the most effective performer. Only a very small amount of the program's dollar value would be awarded through competitive contract, and the program office would have little leverage over the workload priorities of other government organizations.

The Preferred Approach: Multiple Contract Model A

In any of the above five strategies, the government could choose to let a contract to an entirely new contractor in the FD phase of the program for any of the design/redesign, production/manufacture, and installation activities. There is inherent risk in shifting from one contractor to another when moving from the development to the production phase of the program. The Navy is planning to mitigate such risk by acquiring the data and information that a new contractor will need to produce the system. The Navy intends to own the design of the system and all technical instructions and manuals related to production and installation of the system.

A review of programs whose characteristics are similar to those of CANES reveals that a number of contracting strategies can yield a successful product. There is no single "right" construct. Some programs we examined adopted a single prime contractor model; others assigned different program tasks to various contractor and government entities. Although any one of the alternatives can be made to work, there were some common themes among successful programs.

First, the government played a leading role in the successful programs. Government representatives participated in specific technical and managerial activities; importantly, the government retained management and decisionmaking responsibilities for the program. Second, although contractors identified what was technically possible and carried out the lion's share of the actual software and hardware development, the government maintained responsibility for specifying the requirements and, critically, for testing. The government also maintained responsibility for the development of the architecture specification. Third, the government guided the integration effort by clearly specifying the roles and responsibilities of the various parties through an integration plan and integration strategy. This guidance included government participation in and management of standards and protocols required to aid the integration effort. Although standards were proposed by contractors in some cases, the government approved or disapproved those recommendations. This required maintaining technical expertise within the government program offices, even though most of the actual programming work was done by contractors. Fourth, successful programs assigned functions to the organizations that could provide the best value (quality and cost). Successful programs provided incentives for schedule performance but also permitted the flexibility required to carry out constant technical updates and to cope with uncertainties, such as integration challenges and changing operational schedules.

Multiple Contract Model A assigns the technical, production, and installation functions to the organizations that can provide the best value. It keeps competitive pressure on costs of ship-set production and minimizes the risk of installation failure by using the existing IMO process for installation.[4] Model A is superior to the single prime contractor option in several important respects:

- It requires active and continuous government involvement, which, as noted earlier, is a common theme among the successful military information technology (IT) programs we reviewed.
- It obtains frequent competitive prices for IT hardware in an environment where hardware capabilities and prices are constantly improving.
- It uses proven SPAWAR IMO processes to install CANES on board warships and does not require the development of new processes and the negotiation of numerous contract changes to reflect constantly changing ship schedules and shipyard service costs.

Because it uses the IMO for CANES installation, Model A is superior to Models B and C, which, like the single prime contractor option, require the development of new processes and the negotiation of numerous contract changes. Model A is also preferable to the government option because it obtains competitive prices for IT hardware.

Considerations for Any Contracting Strategy

All the risks and lessons learned point to the need for a flexible and agile contracting strategy. The amount of risk in the FD phase will depend on the quality of the design that emerges from the design phase of the program. PEO C4I should consider a strategy that will help mitigate the risk of receiving an incomplete or inadequate design. In addition, there should be flexibility to meet changing system requirements through periodic upgrades and to eliminate unwanted or infeasible requirements. We recommend that the PEO adopt a "crawl, walk, run" approach that targets the most important requirements first and then develops the capability over time. In a program as technically complex as CANES, evolving a capability is less risky than attempting to develop all the desired capabilities in a single step.

In addition, the program office should be aware of both some common network integration pitfalls and some potential mitigation strategies.[5] For example, two common problems have been (1) a lack of sharing of proprietary source code between the government and industry and (2) a lack of technical manuals. The FD contract should ensure that such items are

[4] Interviews with CANES program office staff provided examples of cases where the IMO was not used. In one case, the installation was significantly delayed and ultimately scheduled through the IMO because the selected contractors did not have the necessary qualifications and certifications to enter the shipyard.

[5] Programs are discussed in Chapter Four.

addressed. Mitigation strategies for the common network implementation pitfalls observed in our case studies include

- creating an integrated requirements document (for all ship networks) that contains individual functional-area requirements
- requiring the design team to work with the operational users of the system to identify system functional and end-user requirements *before* system concept design
- writing a well-defined concept of operations that encompasses the entire system and user functional interactions of individual networks, ship systems, and other interfaces
- reducing the amount of manually inputted data by allowing data to be passed from system to system whenever possible
- conducting a risk analysis and implementing a management process with full-scale testing for each ship or ship type under dynamic shipboard conditions for all new technology, equipment, and architectures or configurations that have never before been used on a ship
- conducting a land-based test of the system prior to shipboard installation, or, if that is too costly, developing a virtual integration concept that involves all system sites
- ensuring that contractor-furnished equipment (CFE) is not designed and procured years before installation so as to avoid hardware obsolescence
- developing a life-cycle software and maintenance-control plan
- establishing a dedicated organizational entity to serve as life-cycle manager in an in-house Navy organization with staffing components from headquarters, naval organizations, and private companies
- establishing a distinct program and system integration office that is responsible for interface control, management of all CFE and GFE system hardware, software maintenance and control, systems integration, system-level functional requirements, control for services and resources, budget formulation, future technical changes, interface control, and plan execution
- conducting several meetings one year before the first system delivery to determine whether requirements are feasible or need to be modified
- putting C4I personnel and systems on board earlier in the shipbuilding process so that the users are properly acclimated to the network
- providing more shipboard training or establishing a reliable remote management capability to effectively monitor the health of the network
- ensuring that networks are not "ship-unique," thereby allowing for cost-effectiveness in schoolhouse training
- synchronizing multiple upgrades when upgrading systems so as to identify adverse effects earlier.