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Acquisition and Competition Strategy Options for the DD(X)

The U.S. Navy’s 21st Century Destroyer

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Summary

In 1994, the U.S. Navy initiated a program to transform America’s surface combatant fleet by developing a new family of ships. These new ships—equipped with a range of state-of-the-art hull, propulsion, weapons, electronics, and communications technologies—were designed to enable the Navy to project power more rapidly, wage war more effectively, and operate less expensively, compared with vessels currently in the fleet.

To implement this transformation effort, the Navy has prepared an acquisition plan that will extend over the next two decades. The acquisition plan in place at the time we conducted and documented this study aimed to procure and place into service the entire family of new ships, consisting of up to 24 destroyers, along with an undetermined number of cruisers and smaller vessels for littoral operations, by about 2025. As explained in Chapter Six, that plan was revised significantly in 2005, scaling back the Navy’s acquisition to between eight and 12 of the new destroyers.

The destroyer—currently designated DD(X)—will be the centerpiece of this new family. Navy planners envision that the DD(X) will be a multimission surface combatant capable of bringing offensive, distributed, and precision firepower at long range in support of forces ashore. At the time of our study, the Navy planned to procure the first DD(X) in 2005 and to have that vessel delivered into service in 2011. According to the revised, smaller acquisition plan announced in 2005, those procurement and delivery dates will be postponed by a year.
The Challenge

The DD(X) program is approaching a key decision point in the Department of Defense (DoD) acquisition process. Starting in mid-1998, two competitive industry teams conducted design studies during Phases I and II of the program. In April 2002, the team led by Northrop Grumman Ship Systems (NGSS) and including Raytheon Systems Co. was selected as winner of that competition and placed under contract to perform a three-year technology development and maturation effort (Phase III). Upon completion of Phase III, scheduled for the first half of CY 2005, the program will be ready to enter Phase IV. At that time a Milestone B review will be performed and the Navy will negotiate contracts for the detail design of the ship and warfare system and construction and test of the lead ship.

In most major system acquisitions, completing a Milestone B review would result in the Navy selecting a single prime contractor and authorizing it to perform the program’s remaining development and production efforts. However, the DD(X) program differs from that traditional process in two important ways. First, as noted above, a winner of the design rivalry was selected in mid-2002 and awarded nearly $3 billion for a three-year period of technology development and maturation before starting detail design and lead ship construction. Second, the Acquisition Strategy approved at the beginning of Phase III included the statement, “The Navy intends to have competition in detail design and ship construction throughout the production period” (DD[X] Land Attack Destroyer Single Acquisition Management Plan, Revision D, November 27, 2001, p. 18).

Currently, only two shipyards (Bath Iron Works and NGSS/Ingalls) have a demonstrated capability of building DD(X)-class surface combatants. Thus, in Phase IV of the DD(X) program the Navy faces a range of objectives that are not always internally consistent: make the best use of competition throughout detail design and production; maintain a strong industrial base capable of building surface combatants; and achieve program cost, schedule, and performance objectives.
The decisions the DD(X) Program Office makes with respect to these issues will shape the future of the program. Recognizing the importance of these decisions, the Navy in 2003 tasked RAND to evaluate the advantages and disadvantages of different acquisition and contracting strategies that defense officials could employ on the DD(X) program. Over the six-month duration of this study, RAND sought to identify strategies that would increase the likelihood that the Navy would achieve its full range of program objectives.

How the Challenge Was Examined

We pursued this evaluation by asking three questions:

- What DD(X) program tasks might be appropriate to compete in the future?
- How should the DD(X) program be organized to best support the objective of ensuring a continued presence of a strong shipbuilding industrial base for surface combatants, at minimum cost to the Navy?
- What are the relative advantages and risks of alternative contracting methods for the various tasks involved in Phase IV?

We examined the issue of how best to employ competition by first laying out a rich set of options, some employing head-to-head competition at various points during Phase IV and others resorting to directed buys. Each option was then examined by drawing on experience from past major defense acquisition programs and estimating the likely balance of costs and benefits resulting from each option. While the results are largely subjective, they are based on a substantial history of how competition has worked out in a variety of earlier acquisition programs.

Effects of the DD(X) program on the shipbuilding industrial base were examined by modeling the supply and demand for shipyard labor under each of several options for distributing the work among the two shipyards and for scheduling the work across calendar time.
While the effects of those different business profiles on the continuing viability of the firms could not be deduced with great precision, the analysis did provide useful insights.

Finally, several different contracting strategies were examined in terms of how they would accommodate the particular objectives and constraints of the DD(X) program, and conclusions were drawn based on outcomes of similar programs and contract strategies in the past.

**Results of the Study**

We came to three overarching conclusions.

Neither design rivalry for system configuration nor price competition for production of the DD(X)’s ship systems and warfare systems appears practical during the initial portions of Phase IV. An extended design rivalry was conducted during Phases I and II of the program. Reopening that design rivalry after three years and about $3 billion invested in refinement and risk reduction would entail significant costs in time and dollars, and we could see no reasonable basis for expecting corresponding benefits in either cost of the detail design process or quality of the detail design product.

Price competition has been generally difficult to achieve in production of military ship systems. Quantities are relatively small, and costs of starting and sustaining a second producer are relatively large, thus making direct cost competition impractical in most cases. There has been some suggestions of benefits from competition in production of ships with long production runs. However, achievement of similar results in DD(X) production would be severely limited by the Navy’s stated policy of sustaining both shipyards as viable business entities, and by the desire for cooperation between the shipyards during detail design. On balance, we conclude that price competition

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1 This issue is examined in Appendix B. While Navy program managers believe they have achieved some benefits from competition in such programs as the DDG 51 class, it is not possible to demonstrate from procurement records that a true price reduction was achieved.
for the early phases of ship production is impractical. Similarly, price competition for warfare system production will be impractical during at least the initial production because of the likely evolution of the design and very short production runs for any particular configuration.

The currently projected schedule of detail ship design and construction together with the plan to distribute business equally to both shipyards should provide enough business to sustain both shipyards as viable competitors for future surface combatant programs. While the projected overall level of business from the DD(X) program appears sufficient to sustain both shipyards at a level of activity near that of the 1990s, that conclusion is subject to two important caveats. One is that ship design and construction schedule must not be allowed to slip very much. The DD(X) Program Office’s current plan postulates an even distribution of ships to the two shipyards, with the lead ship going to NGSS, the second ship to BIW, and then alternating allocation of ships until the end of the production run. Under the acquisition plan in place at the time we conducted our research, production of the first DD(X) was scheduled to start in August 2007. That was already too late to permit a smooth transition from other work to DD(X) production at either shipyard, and consequently each shipyard will experience some turbulence in demand for shipyard labor, with consequent increase in cost. While those transients appear manageable (albeit at some cost), the history of major weapon development programs shows that schedules projected before start of final design and initial ship construction are rarely achieved, whether because of technical or funding problems. Our analysis showed that delays of even one year, particularly for the first ship to be constructed at BIW, could lead to serious levels of turbulence in demand for ship construction labor and consequent increased cost of discharging, hiring, and training workers. Greater delays could endanger the objective of supporting both shipyards or demand other actions to support the production labor pool at that shipyard during the transition.

We found that changing the allocation of work between the shipyards would not offer unencumbered benefits. We estimated that
shifting the allocation to as much as 75 percent to one shipyard or the other would be near the limit of practicality in terms of sustaining both shipyards as viable commercial concerns. Within that range, each shift might smooth the labor demand in one shipyard but worsen it in the other. No distribution uniformly stood out as the best alternative.

The second caveat to the “industrial base support” conclusion is that both shipyards must receive substantial levels of ship design work to sustain their technical staffs. That might pose a challenge to the Navy in creating a contracting and management strategy for the detail design and early ship construction period in the DD(X) program. That challenge is discussed below.

The presence of three major producers (two shipyards and a mission equipment producer/integrator) in the program and the presence of both design and production tasks to be performed in Phase IV suggest a mix of contracting strategies.

We examined several different contracting methods that could be applied to Phase IV, with special attention to how each method would affect the balance of Navy management workload and Navy opportunities to exercise close control over the industry members.

- One option would call for the Navy to contract individually with each major member of the industry team now involved with the DD(X): each shipyard and the warfare system producer. That would require the Navy to manage the total system integration during detail design and then to provide the warfare system as government-furnished equipment (GFE) to each shipyard during production. We deemed that level of Navy involvement to be inconsistent with recent trends in Navy management staffing and with Navy policy.
- A second group of options would require a single industry agent to contract with the Navy for full management of detail design and subsequent production. That single agent could be one of the firms now developing the DD(X) or a consortium of the several major participants. If one contractor served as the single agent throughout construction, the inherent competitive posture
between the two shipyards could pose problems in administration. A preferred strategy would be to encourage the key firms to create a consortium, with the appropriate interfirm agreements and protocols worked out in advance to the greatest extent possible. The current agreement between Newport News Shipyard and Electric Boat for production of the *Virginia*-class submarine appears to be a useful model.

- A third option would be to use different contracting models for different tasks and phases of the project. Use of a single prime to manage detail design and final system integration has powerful advantages of focusing authority for managing that technically demanding task. Conversely, the Navy could better control the production process by contracting directly with the shipyards, thus retaining an opportunity to inject some level of competition into the later stages of that production. Such a multistage contracting strategy does not have a well-developed history or proven set of practices and must be approached with care.

We concluded that the third option is most likely to provide an effective contract structure for managing Phase IV of the DD(X) program.