Order Code RL33741

CRS Report for Congress

Navy Littoral Combat Ship (LCS) Program: Background, Oversight Issues, and Options for Congress

Updated April 7, 2008

Ronald O'Rourke
Specialist in Naval Affairs
Foreign Affairs, Defense, and Trade Division

Prepared for Members and
Committees of Congress

Navy Littoral Combat Ship (LCS) Program: Background, Oversight Issues, and Options for Congress

Summary

The Navy is procuring a new type of surface combatant called the Littoral Combat Ship (LCS). The Navy substantially restructured the LCS program in 2007 in response to significant cost growth and schedule delays in the program. The Navy's proposed FY2009 budget requests $920 million in procurement funding for the procurement of two LCSs, which would be the fourth and fifth ships in the restructured LCS program.

The LCS is a small, fast, relatively inexpensive combat ship that is to be equipped with modular "plug-and-fight" mission packages, including unmanned vehicles (UVs). The basic version of the LCS, without any mission packages, is referred to as the LCS sea frame. The Navy wants to procure a total of 55 LCSs.

Congress originally funded a total of six LCS sea frames (LCSs 1 through 6) in the FY2005, FY2006, and FY2007 defense budgets. In 2007, as Congress was considering the proposed FY2008 defense budget, the Navy canceled LCSs 3 though 6 as part of its restructuring of the program, leaving only LCSs 1 and 2 under construction.

As part of its final action on the FY2008 defense budget, Congress did the following, among other things, regarding the LCS program: accepted the Navy's cancellation of LCSs 3 through 6; funded the procurement one additional LCS in FY2008 (which the Navy now calls LCS-5); significantly reduced the Navy's FY2008 funding request for the LCS program; amended the LCS sea frame unit procurement cost cap (something the Navy had requested, though not in the exact form that Congress eventually legislated); required the Navy to use fixed-price-type contracts for the construction of LCSs procured in FY2008 and subsequent years (something the Navy had stated an intention to do as part of its plan for restructuring the LCS program); criticized the execution of the LCS program; expressed concerns for the program; and expressed support for continuing with the program in restructured form.

The issue for Congress for FY2009 is whether to approve, reject, or modify the Navy's restructured LCS program. The LCS program raises potential oversight issues for Congress relating to cost growth, total program acquisition cost, the procurement cost cap, technical risk, operational evaluation and competition for production, a proposed common combat system, and coordination of sea frames and mission packages. This report will be updated as events warrant.

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Introduction

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The LCS is a small, fast, relatively inexpensive combat ship that is to be equipped with modular "plug-and-fight" mission packages, including unmanned vehicles (UVs). The basic version of the LCS, without any mission packages, is referred to as the LCS sea frame. The Navy wants to procure a total of 55 LCSs. The Navy's planned force of 55 LCSs accounts for about 18% of its planned fleet of 313 ships of all types.[1]

Congress originally funded a total of six LCS sea frames (LCSs 1 through 6) in the FY2005, FY2006, and FY2007 defense budgets. In 2007, as Congress was considering the proposed FY2008 defense budget, the Navy canceled LCSs 3 though 6 as part of its restructuring of the program, leaving only LCSs 1 and 2 under construction. The reduction of the LCS program in a single year from six prior-year-funded ships to two due to cost growth and schedule delays was an occurrence with few parallels in the recent history of Navy shipbuilding.

As part of its action on the FY2008 defense budget, Congress did the following, among other things, regarding the LCS program:

- accepted the Navy's cancellation of LCSs 3 through 6,
- funded the procurement one additional LCS in FY2008 (which the Navy now calls LCS-5),[2]

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[1] For more on the Navy's planned 313-ship fleet, see CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke.

[2] The Navy apparently calls this ship LCS-5 because the original LCS-5 and LCS-6 were canceled by the Navy before they were replaced under contract, leaving LCS-4 as last LCS under contract to have been canceled. In spite of its designation, LCS-5 will be the third

(continued...)

- significantly reduced the Navy's FY2008 funding request for the LCS program,
- amended the LCS sea frame unit procurement cost cap (something the Navy had requested, though not in the exact form that Congress eventually legislated),
- required the Navy to use fixed-price-type contracts for the construction of LCSs procured in FY2008 and subsequent years (something the Navy had stated an intention to do as part of its plan for restructuring the LCS program),
- criticized the execution of the LCS program,
- expressed concerns for the program, and
- expressed support for continuing with the program in restructured form.

Developments in the LCS program in 2007 have caused some observers, particularly those associated with the LCS program, to express concern about the program's future. The Navy has stated repeatedly that, the developments of 2007 notwithstanding, the Navy remains committed to a 55-ship LCS program. As mentioned above, although Congress has criticized the execution of the program, it has expressed support for continuing with the program in restructured form. None of the congressional defense-oversight committees, in marking up the FY2008 budget, recommended terminating the LCS program or reducing the Navy's planned 55-ship total.

The issue for Congress for FY2009 is whether to approve, reject, or modify the Navy's restructured LCS program. Decisions that Congress makes on this issue could affect future Navy capabilities and funding requirements, and the shipbuilding industrial base.

Background

LCS Program in Brief

Announcement of LCS Program. The LCS program was announced on November 1, 2001, when the Navy stated that it was launching a Future Surface Combatant Program aimed at acquiring a family of next-generation surface combatants. This new family of surface combatants, the Navy stated, would include three new classes of ships:

- **a destroyer called the DD(X)** — later redesignated the DDG-1000 — for the precision long-range strike and naval gunfire mission,[3]

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[2] (...continued)
LCS in the restructured LCS program, and the seventh to have been funded by Congress.

[3] For more on the DDG-1000 program, see CRS Report RL32109, *Navy DDG-1000 Destroyer Program: Background, Oversight Issues, and Options for Congress*, by Ronald
(continued...)

- **a cruiser called the CG(X)** for the air defense and ballistic missile mission,[4] and

- **a smaller combatant called the Littoral Combat Ship (LCS)** to counter submarines, small surface attack craft, and mines in heavily contested littoral (near-shore) areas.

The LCS. The LCS is a small, fast, relatively inexpensive surface combatant that is to be equipped with modular "plug-and-fight" mission packages, including unmanned vehicles (UVs). Rather than being a multimission ship like the Navy's larger surface combatants, the LCS is to be a focused-mission ship equipped to perform one or two missions at any one time. The ship's mission orientation is to be changed by changing out its mission packages. The basic version of the LCS, without any mission packages, is referred to as the LCS sea frame.

The LCS's primary intended missions are shallow-water antisubmarine warfare, mine countermeasures, countering small boats, and intelligence, surveillance, and reconnaissance (ISR). Secondary intended missions include homeland defense, maritime intercept operations, and support of special operations forces.

The LCS is to displace about 3,000 tons, making it about the size of a corvette or Coast Guard cutter. It is to have a maximum speed of about 45 knots, compared to something more than 30 knots for the Navy's larger surface combatants. The LCS is to have a shallower draft than the Navy's larger surface combatants, permitting it to operate in certain coastal waters and visit certain ports that are not accessible to the Navy's larger surface combatants. The LCS is to employ automation to achieve a reduced "core" crew of 40 sailors. Up to 35 or so additional sailors are to operate the ship's embarked aircraft and mission packages, making for a total crew of about 75, compared to more than 200 for the Navy's frigates and 300 or more for the Navy's current destroyers and cruisers.

As mentioned earlier, Navy plans call for procuring a total of 55 LCSs. The Navy currently plans to procure a total of 64 mission packages for the 55 ships. Earlier Navy plans anticipated procuring between 90 and 110 mission packages for a 55-ship fleet.

Summary Of Congressional Action In FY2005-FY2008.

FY2005. In FY2005, Congress approved the Navy's plan to fund the construction of the first two LCS sea frames using research and development funds rather than shipbuilding funds, funded the first construction cost of the first LCS (LCS-1), required the second LCS (LCS-2) to be built (when funded in FY2006) to a different design from the first, prohibited the Navy from requesting funds in FY2006 to build a third LCS, and required all LCSs built after the lead ships of each

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[3] (...continued)
O'Rourke.

[4] For more on the CG(X) program, see CRS Report RL34179, *Navy CG(X) Cruiser Program: Background, Oversight Issues, and Options for Congress*, by Ronald O'Rourke.

design to be funded in the SCN account rather than the Navy's research and development account.

FY2006. In FY2006, Congress funded the procurement of LCSs 2, 3, and 4. (The Navy requested one LCS for FY2006, consistent with Congress's FY2005 action. Congress funded that ship and provided funding for two additional ships.) Congress in FY2006 also established a unit procurement cost limit on the fifth and sixth LCS sea frames of $220 million per ship, plus adjustments for inflation and other factors (Section 124 of the FY2006 defense authorization bill [H.R. 1815/P.L. 109-163] of January 6, 2006), required an annual report on LCS mission packages, and made procurement of more than four LCSs contingent on the Navy certifying that there exists a stable design for the LCS.

FY2007. In FY2007, Congress funded the procurement of LCSs 5 and 6. (The Navy canceled these two ships in 2007 before they were placed under contract for construction.)

FY2008. In FY2008, as mentioned earlier, Congress accepted the Navy's cancellation of LCSs 3 through 6; funded the procurement one additional LCS in FY2008 (which the Navy now calls LCS-5); significantly reduced the Navy's FY2008 funding request for the LCS program; amended the LCS sea frame unit procurement cost cap to $460 million per ship for LCSs procured in FY2008 and subsequent years (Section 125 of the conference report [H.Rept. 110-477 of December 6, 2007] on H.R. 1585, the FY2008 defense authorization bill, which was enacted as H.R. 4986/P.L. 110-181 of January 28, 2008); and required the Navy to use fixed-price-type contracts for the construction of LCSs procured in FY2008 and subsequent years.

The Navy in 2007 requested that Congress amend the existing unit procurement cost cap for the fifth and sixth ships to $460 million, plus adjustments for inflation and other factors. Congress amended the cost cap to $460 million, but applied it not only to the fifth and sixth LCSs, but to all LCSs procured in FY2008 and subsequent years. The use of fixed-price contracts for future LCSs was something that the Navy had stated an intention to do as part of its plan for restructuring the LCS program.

Two Industry Teams, Each With Its Own Design. On May 27, 2004, the Navy awarded contracts to two industry teams — one led by Lockheed Martin, the other by General Dynamics (GD) — to design two versions of the LCS, with options for each team to build up to two LCSs each. The two teams' LCS designs are quite different — Lockheed's uses a semi-planing steel monohull, while GD's uses an aluminum trimaran hull. The Lockheed team was assigned LCS-1 and (the now-canceled) LCS-3, while the GD team was assigned LCS-2 and (the now-canceled) LCS-4. Lockheed announced plans to build its LCSs at Marinette Marine of Marinette, WI, and Bollinger Shipyards of Lockport, LA, with LCS-1 being built by Marinette and LCS-3 to have been built by Bollinger. GD announced plans to build its LCSs at the Austal USA shipyard of Mobile, AL.[5]

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[5] Austal USA was created in 1999 as a joint venture between Austal Limited of Henderson, (continued...)

Planned Procurement. As shown in **Table 1**, following the restructuring of the program in 2007, the Navy wants to procure a total of 21 LCSs through FY2013.

Table 1. Actual and Planned LCS Procurement Through FY2013
(following restructuring of program in 2007)

FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
1	1[a]	0[a]	1	2	3	3	4	6

Source: Navy FY2009 budget submission.

a. Four additional LCSs originally that were funded by Congress in FY2007 and FY2008 (two in each year) were canceled by the Navy as part of the 2007 restructuring of the LCS program.

Program Funding. **Table 2** shows LCS acquisition (i.e., research and development plus procurement) funding for FY2007 through FY2013 as reflected in the FY2009 budget submission. The figures in the table reflect reprogramming of prior-year program funding undertaken as part of the Navy's 2007 restructuring of the LCS program. In addition to the funding shown in the table, the LCS program also received about $1.7 billion in acquisition funding between FY2003 and FY2006.

With Congress's permission, the Navy procured the first and second LCSs through the Navy's research and development account. Subsequent LCSs are being procured through the Navy's ship-procurement account, called the Shipbuilding and Conversion, Navy (SCN) account. The Navy is procuring LCS mission packages through the Other Procurement, Navy (OPN) account.

Total Acquisition Cost. The Navy has not provided an estimated total acquisition (i.e., development plus procurement) cost for the LCS program. CRS estimates that the LCS program (including mission packages) might have a total acquisition cost of roughly $29.6 billion. This estimate includes $2.5 billion in research and development costs (including the construction of first two LCS sea frames and the procurement of the first four mission packages), procurement of 53 additional LCS sea frames at a cost of $460 million each, and 64 mission packages procured at an average cost of about $42.3 million each.[6] This estimates does not include costs for LCS-related aircraft procurement or weapon procurement, such as those shown in the APN and WPN rows of **Table 2**.

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[5] (...continued)
Western Australia and Bender Shipbuilding & Repair Company of Mobile, AL. The GD LCS team also includes GD/BIW as prime contractor to provide program management and planning, provide technical management, and to serve as "LCS system production lead."

[6] The Navy reportedly wants to procure 24 mine warfare mission packages at an average cost of $68 million each, 16 antisubmarine warfare packages at an average cost of $42.3 million each, and 24 surface warfare packages at an average cost of $16.7 million each. (Emelie Rutherford, Littoral Combat Ship Mission Packages Range In Costs, Features," *Inside the Navy*, September 3, 2007; for similar figures, see Christopher P. Cavas, "First LCS Mission Package Ready For Delivery," *DefenseNews.com*, August 29, 2007.)

Table 2. LCS Program Acquisition Funding, FY2007-FY2013
(millions of dollars; figures rounded to nearest million)

Budget account[a]	FY07	FY08	FY09	FY10	FY11	FY12	FY13	Total for FY07 thru FY13
RDT&EN	664	304	371	281	139	168	116	2044
SCN	93	337	920	1380	1380	1840	2760	8709
APN	37	37	55	73	76	96	103	478
WPN	0	0	3	25	47	45	11	131
OPN	79	0	131	235	242	252	227	1167
TOTAL	**873**	**678**	**1480**	**1994**	**1884**	**2401**	**3217**	**12529**

Source: Navy FY2009 budget submission. Figures may not add due to rounding. The program also received about $1.7 billion in acquisition funding between FY2003 and FY2006.

a. RDT&EN = Research, Development, Test, and Evaluation, Navy account; SCN = Shipbuilding and Conversion, Navy account; APN = Aircraft Procurement, Navy account; WPN = Weapons Procurement, Navy account; OPN = Other Procurement, Navy account.

2007 Program Restructuring

March 2007 Navy Restructuring Plan. In response to significant cost growth and schedule delays in the building of the first LCSs that first came to light in January 2007 (see next section), the Navy in March 2007 announced a plan for restructuring the LCS program that:

- canceled the two LCSs funded in FY2007 (LCSs 5 and 6) and redirected the funding for those two ships to pay for cost overruns on earlier LCSs;

- announced an intention to lift a 90-day stop-work order that the Navy had placed on LCS-3 in January 2007 — provided that the Navy reached an agreement with the Lockheed-led industry team by April 12, 2007, to restructure the contract for building LCSs 1 and 3 from a cost-plus type contract into a fixed price incentive (FPI)-type contract — or terminate construction of LCS-3 if an agreement on a restructured contract could not be reached with the Lockheed team by April 12, 2007;

- announced an intention to seek to restructure the contract with the General Dynamics-led industry team for building LCSs 2 and 4 into an FPI-type contract — if LCSs 2 and 4 experienced cost growth comparable to that of LCSs 1 and 3 — and, if such a restructuring were sought, terminate construction of LCS-4 if an agreement on a restructured contract for LCS-2 and LCS-4 could not be reached;

- reduced the number of LCSs requested for FY2008 from three to two (for the same requested FY2008 procurement funding of $910.5 million), and the number to be requested for FY2009 from six to three; and

- announced an intention to conduct an operational evaluation to select a favored design for the LCS that would be procured in FY2010 and subsequent years, and to conduct a full and open follow-on competition among bidders for the right to build that design.[7]

April 2007 Termination of LCS-3. On April 12, 2007, the Navy announced that it had not reached an agreement with Lockheed on a restructured FPI-type contract for LCS-1 and LCS-3, and consequently was terminating construction of LCS-3.[8] (The Navy subsequently began referring to the ship as having been partially terminated — a reference to the fact that Lockheed was allowed to continue procuring certain components for LCS-3, so that a complete set of these components would be on hand to be incorporated into the next LCS built to the Lockheed design.)

November 2007 Termination of LCS-4. In late-September 2007, it was reported that the Navy on September 19 had sent a letter to General Dynamics to initiate negotiations on restructuring the contract for building LCSs 2 and 4 into an FPI-type contract. The negotiations reportedly were to be completed by October 19, 2007 — 30 days from September 19.[9] On November 1, 2007, the Navy announced that it had not reached an agreement with General Dynamics on a restructured FPI-type contract for LCS-2 and LCS-4, and consequently was terminating construction of LCS-4.[10]

July 2007 Navy Testimony on Common Combat System. The two LCS designs currently use two different, contractor-furnished combat systems.[11] As an added element of its restructuring of the LCS program, the Navy testified in July

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[7] Source: Navy briefing to CRS and Congressional Budget Office (CBO) on Navy's proposed LCS program restructuring plan, March 21, 2007.

[8] Department of Defense News Release No. 422-07, April 12, 2007, "Navy Terminates Littoral Combat Ship 3."

[9] Geoff Fein, "Navy Seeking To Negotiate FPI Contract With General Dynamics," *Defense Daily*, September 24, 2007; Geoff Fein, "Navy, General Dynamics Meet To Discuss New LCS Fixed Price Structure," *Defense Daily*, September 27, 2007; Tony Capaccio, "General Dynamics Urged To Take Fixed Price On Warship Contract," *Bloomberg News*, September 28, 2007; Jason Sherman, "Navy, General Dynamics Discuss Fixed-Price Contract For LCS," *Inside the Navy*, October 1, 2007.

[10] Department of Defense News Release No. 1269-07, November 1, 2007, "Navy Terminates Littoral Combat Ship (LCS 4) Contract."

[11] A ship's combat system typically includes its sensors, computers, displays, and weapon launchers. The discussion here refers to the part of the LCS combat system that is permanently built into each sea frame, and not to the part that would be added by a modular mission package.

2007 that it wants to shift to a common, government-furnished combat system for LCSs procured in FY2010 and beyond.[12] The Navy proposed to begin work on the common combat system in FY2007 using some of the prior-year LCS program funding that the Navy has requested Congress to reprogram.

August 2007 Navy Report on Acquisition Strategy. Although the Navy in its March 2007 restructuring plan announced an intention to conduct an operational evaluation to support the selection of a single LCS design to be procured in FY2010 and beyond, the Navy stated in an August 2007 report to Congress on the LCS program that "the Navy may elect to continue production of both seaframes should each design present a unique operational advantage."[13]

March 2008 Navy Testimony on Acquisition Strategy

The Navy testified in March 2008 that:

> The Navy believes that active oversight and strict cost controls are needed to deliver these ships [LCSs] to the fleet over the long run. The Navy demonstrated strong oversight when it terminated the contracts for LCS-3 and LCS-4 in 2007.
>
> It is vital that the Navy continue through first-of-class construction challenges to complete LCS 1 and LCS 2. When these ships are delivered, the Department [of the Navy] will be able to better evaluate their costs and capabilities. LCS 1 and LCS 2 are currently scheduled to deliver to the Navy in 2008. Both LCS 1 and LCS 2 will conduct post-delivery test and trials in 2009....
>
> The FY 2009 President's Budget request includes $920 million for two additional LCS seaframes. The Navy also intends to execute the FY 2008 appropriation for one seaframe, utilizing the remaining funding and material from the terminated ships. The Navy will also seek congressional support for the reprogramming of these funds for the FY 2008 procurement. Under an acquisition strategy approved in January 2008 by the Defense Acquisition Executive, the FY 2008 and 2009 awards will be for fixed-price incentive fee contracts, based on a limited competition between the current LCS seaframe prime contractors. These ships will be designated as Flight 0+ and will include all existing approved engineering changes developed from lessons learned, along with any current improvements to construction or fabrication procedures. The Navy will incorporate further lessons learned from LCS 1 and 2 sea trials into these ships prior to production. Any such changes will be minimized to those essential for safety and/or operability.
>
> Acquisition strategies for FY 2010 and follow ships are under Navy review. OSD will conduct a Milestone B prior to FY 2010 procurement. The Navy and

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[12] Statement of VADM Paul Sullivan et al., Before the Subcommittee on Seapower and Expeditionary Forces of the House Armed Services Committee on Surface Combatant Construction Update, July 24, 2007, p. 8.

[13] *Report to Congress, Littoral Combat Ship, Prepared by Deputy Assistant Secretary of the Navy, Ships, Washington, DC 20350, August 2007*, p. 7. See also p. 3.

OSD will consider the questions of single seaframe assessment and competition plans as part of the FY 2010 acquisition strategy deliberations.[14]

Cost Growth on LCS Sea Frames

Summary of Cost Growth. The Navy originally spoke of building LCS sea frames for about $220 million each in constant FY2005 dollars. Estimated LCS sea frame procurement costs have since grown substantially above that figure. The estimate for LCS-1 has grown from $215.5 million in the FY2005 budget to $531 million in the FY2009 budget. The estimate for LCS-2 has grown from $213.7 million in the FY2005 budget to $507 million in the FY2009 budget.

The figures of $531 million and $507 million in the previous paragraph are end-cost figures. End cost is the figure often reported as the total procurement cost of a Navy ship. It is a fairly comprehensive figure for a ship's procurement cost, but it does exclude certain cost elements. The FY2009 budget submission states that when additional costs for outfitting and post delivery and for "final system design/mission systems and ship integration team" are included, the total estimated procurement costs of LCS-1 and LCS-2 become $631 million and $636 million, respectively.

The FY2009 budget submission also shows that the estimated cost of follow-on LCS sea frames has increased to $460 million each — the same figure that Congress used in 2007 in amending the unit procurement cost cap for LCS sea frame procurement.

A March 2008 press report suggests that the cost of LCS-2 might increase by $41 million above the figures reported in the FY2009 budget submission. This increase, if realized, would increase the cost of LCS-2 to $548 million (end cost) or $677 million (more broadly defined cost).

CBO testified in March 2008 that it estimates that the cost of LCS-1 and LCS-2 (more broadly defined) could increase to about $700 million each, and that the cost of follow-on LCSs could increase to about $550 million each.

Review of Cost Growth Over Time. Estimated LCS sea frame procurement costs can be viewed as having increased three times — in early 2006, early 2007, and early 2008.

Early 2006. The proposed FY2007 Navy budget, submitted in February 2006, showed that:

- the estimate for the first LCS had increased from $215.5 million in the FY2005 budget and $212.5 million in the FY2006 budget to

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[14] Statement of Vice Admiral Barry McCullough, Deputy Chief of Naval Operations For Integration of Capabilities and Resources, and Ms. Allison Stiller, Deputy Assistant Secretary of the Navy (Ship Programs), before the Subcommittee on Seapower and Expeditionary Forces of the House Armed Services Committee on Navy Force Structure and Shipbuilding, March 14, 2008, pp. 3-4.

$274.5 million in the FY2007 budget — an increase of about 27% from the FY2005 figure and about 29% form the FY2006 figure;

- the estimate for the second LCS increased from $213.7 million in the FY2005 budget and $256.5 million in the FY2006 budget to $278.1 million — an increase of about 30% from the FY2005 figure and about 8% from the FY2006 figure; and

- the estimate for follow-on ships scheduled for FY2009-FY2011, when the LCS program was to have reached a planned maximum annual procurement rate of six ships per year, had increased from $223.3 million in the FY2006 budget to $298 million — an increase of about 33%.

The Navy stated in early 2006 that the cost increase from the FY2006 budget to the FY2007 budget was due mostly to the fact that LCS procurement costs in the FY2006 budget did not include items that are traditionally included in the so-called end cost — the total budgeted procurement cost — of a Navy shipbuilding program, such as Navy program-management costs, an allowance for changes, and escalation (inflation). The absence of these costs from the FY2006 LCS budget submission raised certain potential oversight issues for Congress.[15]

Early 2007. On January 11, 2007, the Navy reported that LCS-1 was experiencing "considerable cost overruns." The Navy subsequently stated that the estimated shipyard construction cost of LCS-1 had grown to $350 million to $375 million. This suggested that the end cost of LCS-1 — which also includes costs for things such as Navy program-management costs and an allowance for changes — could be in excess of $400 million. The Navy did not publicly provide a precise cost overrun figure for LCS 2, but it stated that the cost overrun on LCSs 1 and 2 was somewhere between 50% and 75%, depending on the baseline that is used to measure the overrun.

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[15] These oversight issues included the following:

— Why were these costs excluded? Was this a budget-preparation oversight? If so, how could such an oversight occur, given the many people involved in Navy budget preparation and review, and why did it occur on the LCS program but not other programs? Was anyone held accountable for this oversight, and if so, how? If this was not an oversight, then what was the reason?

— Did the Navy believe there was no substantial risk of penalty for submitting to Congress a budget presentation for a shipbuilding program that, for whatever reason, significantly underestimated procurement costs?

— Do LCS procurement costs in the budget now include all costs that, under traditional budgeting practices, should be included? If not, what other costs are still unacknowledged?

— Have personnel or other resources from other Navy programs been used for the LCS program in any way? If so, have the costs of these personnel or other resources been fully charged to the LCS program and fully reflected in LCS program costs shown in the budget?

The Government Accountability Office (GAO) testified in July 2007 that according to its own analysis of Navy data, the combined cost of LCSs 1 and 2 had increased from $472 million to $1,075 — an increase of 128%.[16] The Congressional Budget Office (CBO) testified in July 2007 that:

> Several months ago, press reports indicated that the cost could well exceed $400 million each for the first two LCS sea frames. Recently, the Navy requested that the cost cap for the fifth and sixth sea frames be raised to $460 million, which suggests that the Navy's estimate of the acquisition cost for the first two LCSs would be around $600 million apiece....
>
> As of this writing, the Navy has not publicly released an estimate for the LCS program that incorporates the most recent cost growth, other than its request to raise the cost caps for the fifth and sixth ships. CBO estimates that with that growth included, the first two LCSs would cost about $630 million each, excluding mission modules but including outfitting, postdelivery, and various nonrecurring costs associated with the first ships of the class. As the program advances, with a settled design and higher annual rates of production, the average cost per ship is likely to decline. Excluding mission modules, the 55 LCSs in the Navy's plan would cost an average of $450 million each, CBO estimates.[17]

Early 2008. As mentioned above, the proposed FY2009 budget, submitted in February 2008, showed that the estimated end costs of LCS-1 and LCS-2 had increased to $531 million and $507 million, respectively (or to $631 million and $636 million, respectively, when certain additional costs are included), and that the estimated unit cost of follow-on ships in the program has increased to $460 million.

On March 14, 2008, the Navy testified that

> The end costs included in the FY 2009 President's Budget request for LCS reflects [sic] the current estimates for LCS 1 and LCS 2 end cost. However, on February 25, 2008, after the submission of the President's Budget to Congress, General Dynamics submitted to the Navy and over target baseline request for LCS 2. The Navy is reviewing the request prior to granting approval for General Dynamics to implement. The details of the request are business sensitive and proprietary. The Navy will continue to actively monitor LCS 1 and 2 cost and schedule performance and to keep the Office of the Secretary of Defense and Congress informed of those estimated costs. The Navy will seek congressional

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[16] Defense Acquisitions[:] Realistic Business Cases Needed to Execute Navy Shipbuilding Programs, Statement of Paul L. Francis, Director, Acquisition and Sourcing Management Team, Testimony Before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, House of Representatives, July 24, 2007 (GAO-07-943T), pp. 4 and 22.

[17] Statement of J. Michael Gilmore, Assistant Director for National Security, and Eric J. Labs, Senior Analyst, [on] The Navy's 2008 Shipbuilding Plan and Key Ship Programs, before the Subcommittee on Seapower and Expeditionary Forces Committee on Armed Services U.S. House of Representatives, July 24, 2007, p. 18.

support to complete the reprogramming of FY 2007 LCS shipbuilding funds to complete LCS 1 and 2.[18]

A March 26, 2008, press report stated that the cost of LCS-2 will increase $41 million "for the year ending Sept. 30," according to "a defense official with knowledge of the increase."[19] The press report characterized the $41-million increase as an increase of 9.3% in the ship's estimated basic construction cost of $440 million. Basic construction cost is a component of ship end cost. When measured against the ship's estimated end cost or its more broadly defined procurement cost as shown in the FY2009 budget ($507 million or $636 million, respectively), an increase of $41 million would equate to an increase of about 8.1% or about 6.4%, respectively.

CBO testified on March 14, 2008 that:

> Historical experience indicates that cost growth in the LCS program was likely. In particular, historical cost-to-weight relationships using the lead ship of the FFG-7 Oliver Hazard Perry class frigate as an analogy indicate that the Navy's original cost target for the LCS of $260 million in 2009 dollars (or $220 million in 2005 dollars) was optimistic. The first FFG-7 cost about $670 million in 2009 dollars to build, or about $250 million per thousand tons, including its combat systems. Applying that metric to the LCS program suggests the lead ships would cost about $600 million apiece, including the cost of one mission module. Thus, in this case, the use of an historical cost-to-weight relationship produces an estimate that is less than the actual costs of the first LCSs to date but substantially greater than the Navy's original estimate.
>
> Based on the actual costs the Navy is incurring for the LCS program, CBO estimates that the first two LCSs could cost about $700 million each, including outfitting and postdelivery and various nonrecurring costs associated with first ships of a class, but excluding mission modules. That estimate is consistent with the estimate CBO provided to this Subcommittee last summer. However, as of December 2007, LCS-1 was 79 percent complete and LCS-2 was 65 percent complete. Thus, additional cost growth is possible, and CBO's estimate reflects that cost risk.
>
> Overall, CBO estimates that the LCSs in the Navy's plan would cost about $550 million each, on average, excluding mission modules. That estimate assumes that the Navy selects one of the two existing designs and makes no changes. As the program advances with a settled design and higher annual rates of production, average ship costs would probably decline, CBO estimates. If the

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[18] Statement of Vice Admiral Barry McCullough, Deputy Chief of Naval Operations For Integration of Capabilities and Resources, and Ms. Allison Stiller, Deputy Assistant Secretary of the Navy (Ship Programs), before the Subcommittee on Seapower and Expeditionary Forces of the House Armed Services Committee on Navy Force Structure and Shipbuilding, March 14, 2008, p. 4.

[19] Tony Capaccio, "General Dynamics Littoral Combat Ship Cost Jumps 9.3 Percent," *Bloomberg News*, March 26, 2008.

> Navy decides to make changes to that design in building future ships, however, the costs of those ships could be higher than what CBO estimates now.[20]

Reasons for Cost Growth. Navy and industry officials have attributed some of the cost growth on the LCS sea frames to an underestimation of the cost impact of applying new Naval Vessel Rules (NVR) — essentially, new rules specifying the construction standards for the ship — to the LCS program. The timing of NVR relative to LCS construction, Navy and industry officials have testified, created a situation of concurrency between design and construction in the LCS program, meaning that the ship was being designed at the same time that the shipyard was attempting to build it — a situation long known to be a potential cause of cost growth. This concurrency, Navy officials testified, was a consequence of the compressed construction schedule for the LCS program, which in turn reflected an urgency about getting LCSs into the fleet to meet critical mission demands.

Regarding LCS-1 itself, Navy and industry officials testified that cost growth was also due to a main reduction gear that was incorrectly manufactured and had to be replaced, forcing a reordering of the construction sequence for the various major sections of LCS-1.

In addition to NVR and the reduction gear issue, the Navy and industry might also have simply underestimated the baseline construction cost of the LCS. Shipyard performance is another potential cause of cost growth. A February 4, 2008, press report stated:

> Marinette Marine, the Wisconsin shipyard building the first Littoral Combat Ship, never received proper certification to manage the project, which has suffered severe cost growth and schedule delays, according to an internal naval audit obtained by sister publication Inside the Pentagon [ITP].
>
> The interim report is the most damning account yet of the LCS program's failure to use earned value management (EVM). Pentagon officials and contractors are supposed to use the process to manage the cost, schedule and performance of acquisition efforts. The idea is to coordinate key project goals and objectively measure progress.
>
> In prepared testimony for his Senate confirmation hearing last October, Pentagon acquisition executive John Young noted that EVM was a "serious deficiency" in the LCS program.
>
> The audit reveals how this deficiency has undermined work on the Freedom (LCS-1), which Marinette Marine is building for Lockheed Martin.
>
> The review, which began a year ago, is still ongoing. However, ITP obtained a redacted copy of the Jan. 7 interim report, originally stamped "for official use only," through the Freedom of Information Act....

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[20] Statement of Eric J. Labs, Senior Analyst, [on] Current and Projected Navy Shipbuilding Programs, before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, U.S. House of Representatives, March 14, 2008, p. 24.

> The review reveals Marinette Marine's poor management and faults the Navy, the Defense Contract Management Agency (DCMA) and Lockheed for failing to notice and fix the problem.

The press report also states:

> Robert Herre, the president and general manager of Manitowoc Marine Group, which operates the shipyard, told ITP in an interview that Marinette Marine never worked on a project before that required the robust EVM needed for the Freedom contract. The management software that the shipyard acquired several years ago was not up to the task. Marinette Marine tried to adapt for the Freedom project by using a manual system, too, Herre said, but it became "more of a cumbersome process than first thought."
>
> Lockheed spokesman Craig Quigley blamed "cost and schedule baseline disconnects" on the Navy for making big changes to the Freedom without agreeing, until last November, to rebaseline both the program's cost and schedule. Previously only the schedule had been rebaselined, he said. Lockheed's team has maintained an EVM system baseline on the program and accurately reported monthly variances, he said.
>
> "Not having the cost and schedule baseline in synchronization prohibits accurate system predictions, but that was accounted for via adjunct reports," he added.
>
> The report says DCMA and Naval Sea Systems Command did not provide sufficient oversight to ensure proper management of the contract; the Navy's Gulf Coast-based shipbuilding office and industry did not effectively review the EVM, or lack thereof; and the program office and the shipyard "placed limited emphasis" on the implementation of EVM for the contract.
>
> DCMA initially granted a "conditional approval" for Marinette Marine's EVM system in April 2006, the report says. The conditional nod was based on a Navy-led EVM system review conducted the year before. However, Pentagon policy does not allow for a "conditional approval" of a contractor's EVM system. DCMA only recognized its error 10 months later, in February 2007, according to the report. The agency then alerted the program office, Lockheed and Marinette Marine that the "conditional approval" had been inappropriate.
>
> Now all agree Marinette Marine lacks a DCMA-validated EVM system, a problem that must be fixed.
>
> The report says Marinette Marine's EVM system did not provide valid and reliable cost, schedule, and technical performance data to support the LCS program office's decision-making. Auditors found the shipyard was not following 24 of the Pentagon's 32 EVM rules. DCMA failed to check whether the 32 rules were being followed. Further, the Navy and DCMA failed to perform formal surveillance to ensure the shipyard heeded the rules, the report says. And Marinette Marine failed to use EVM as an integrated program management tool.
>
> As a result, the Navy is "not receiving full value for program management services and information paid for under this contract," the report states.

The press report also states:

The report describes a "significant breakdown in internal controls." Navy decision-makers are not receiving accurate and reliable earned value data for the Freedom, the review says. The shipyard's projected estimates-at-completion for the Freedom contract are "not supported." Further, the program office "did not have visibility" for project work totaling approximately $51 million. The lack of oversight left the Navy's financial interest in the ship's construction unprotected, the review concludes....

Auditors recommended eight fixes. The report says four remain to be done, but Quigley said two remain to be done. Last November, the Navy completed a new estimate for the cost of completing the Freedom contract, conducted a schedule review and had the program develop a new baseline for the ship. Officials have also had Lockheed start work on a plan to fix the problems.

Quigley said officials have reviewed, approved and monitored Lockheed's plan. He also said the shipyard's efforts are now being checked continuously against the 32 rules.

In March [2008], the Navy plans to review the new baseline. And DCMA is due to conduct a review to ensure the shipyard is following the rules by year's end, the report says. Quigley said that last step could take 18 months.

Unlike Marinette Marine, Lockheed and Gibbs & Cox (another team member), have EVM certification, he said.

Young's predecessor, Kenneth Krieg, warned in a memo last summer that the Pentagon's EVM efforts were "insufficient, especially given the number of major defense programs experiencing execution problems."[21]

GAO testified in July 2007 that:

We have frequently reported on the wisdom of using a solid, executable business case before committing resources to a new product development effort....

A sound business case would establish and resource a knowledge-based approach at the outset of a program. We would define such a business case as firm requirements, mature technologies, and an acquisition strategy that provides sufficient time and money for design activities before construction start. The business case is the essential first step in any acquisition program that sets the stage for the remaining stages of a program, namely the business or contracting arrangements and actual execution or performance. If the business case is not sound, the contract will not correct the problem and execution will be subpar. This does not mean that all potential problems can be eliminated and perfection achieved, but rather that sound business cases can get the Navy better shipbuilding outcomes and better return on investment. If any one element of the business case is weak, problems can be expected in construction. The need to meet schedule is one of the main reasons why programs cannot execute their business cases. This pattern was clearly evident in both the LPD 17 [amphibious ship] and LCS programs. In both cases, the program pushed ahead with

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[21] Christopher J. Castelli, "Audit Exposes Failed Management of Troubled Littoral Warship," *Inside the Navy*, February 4, 2008.

production even when design problems arose or key equipment was not available when needed. Short cuts, such as doing technology development concurrently with design and construction, are taken to meet schedule. In the end, problems occur that cannot be resolved within compressed, optimistic schedules. Ultimately, when a schedule is set that cannot accommodate program scope, delivering an initial capability is delayed and higher costs are incurred....

What happens when the elements of a solid business case are not present? Unfortunately, the results have been all too visible in the LPD 17 and the LCS. Ship construction in these programs has been hampered throughout by design instability and program management challenges that can be traced back to flawed business cases. The Navy moved forward with ambitious schedules for constructing LPD 17 and LCS despite significant challenges in stabilizing the designs for these ships. As a result, construction work has been performed out of sequence and significant rework has been required, disrupting the optimal construction sequence and application of lessons learned for follow-on vessels in these programs....

In the LCS program, design instability resulted from a flawed business case as well as changes to Navy requirements. From the outset, the Navy sought to concurrently design and construct two lead ships in the LCS program in an effort to rapidly meet pressing needs in the mine countermeasures, antisubmarine warfare, and surface warfare mission areas. The Navy believed it could manage this approach, even with little margin for error, because it considered each LCS to be an adaptation of an existing high-speed ferry design. It has since been realized that transforming a high-speed ferry into a capable, networked, survivable warship was quite a complex venture. Implementation of new Naval Vessel Rules (design guidelines) further complicated the Navy's concurrent design-build strategy for LCS. These rules required program officials to redesign major elements of each LCS design to meet enhanced survivability requirements, even after construction had begun on the first ship. While these requirements changes improved the robustness of LCS designs, they contributed to out of sequence work and rework on the lead ships. The Navy failed to fully account for these changes when establishing its $220 million cost target and 2-year construction cycle for the lead ships.

Complicating LCS construction was a compressed and aggressive schedule. When design standards were clarified with the issuance of Naval Vessel Rules and major equipment deliveries were delayed (e.g., main reduction gears), adjustments to the schedule were not made. Instead, with the first LCS, the Navy and shipbuilder continued to focus on achieving the planned schedule, accepting the higher costs associated with out of sequence work and rework. This approach enabled the Navy to achieve its planned launch date for the first Littoral Combat Ship, but required it to sacrifice its desired level of outfitting. Program officials report that schedule pressures also drove low outfitting levels on the second Littoral Combat Ship design as well, although rework requirements have been less intensive to date. However, because remaining work on the first two ships will now have to be completed out-of-sequence, the initial schedule gains most likely will be offset by increased labor hours to finish these ships.

The difficulties and costs discussed above relate to the LCS seaframe only. This program is unique in that the ship's mission equipment is being developed and funded separately from the seaframe. The Navy faces additional challenges integrating mission packages with the ships, which could further increase costs

and delay delivery of new antisubmarine warfare, mine countermeasures, and surface warfare capabilities to the fleet. These mission packages are required to meet a weight requirement of 180 metric tons or less and require 35 personnel or less to operate them. However, the Navy estimates that the mine countermeasures mission package may require an additional 13 metric tons of weight and 7 more operator personnel in order to deploy the full level of promised capability. Because neither of the competing ship designs can accommodate these increases, the Navy may be forced to reevaluate its planned capabilities for LCS.[22]

Potential Oversight Issues for Congress

Cost Growth on LCS Sea Frames

Potential oversight issues concerning cost growth on LCS sea frames include the following:

- Are the actions taken by the Navy as part of its restructuring of the LCS program sufficient to prevent further growth in estimated LCS sea frame unit procurement costs?

- How much of the cost increases on LCSs 1 and 2 are attributable to prime contractor performance? To shipyard performance? To performance by supplier firms? To Navy actions in managing the program?

- Concurrency in design and construction has long been known as a source of risk in shipbuilding and other weapon-acquisition programs. Eliminating concurrency forms part of DOD's effort to move toward best practices in acquisition. In retrospect, did the Navy make a good decision in letting its sense of urgency about the LCS override the known risks of concurrency in design and construction?

- Do the estimated costs of LCSs 1 and 2 reflect systems, components, or materials provided by vendors at reduced prices as part of an effort by those vendors to secure a role in the 55-ship LCS program? If so, how much more expensive might these systems, components, or materials become on later LCSs? Is this a source of concern regarding the potential for cost growth on follow-on LCSs?

- In light of cost growth on LCS sea frames, where does the LCS program now stand in relation to the Nunn-McCurdy provision (10

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[22] Defense Acquisitions[:] Realistic Business Cases Needed to Execute Navy Shipbuilding Programs, Statement of Paul L. Francis, Director, Acquisition and Sourcing Management Team, Testimony Before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, House of Representatives, July 24, 2007 (GAO-07-943T), pp. 8-11.

U.S.C. §2433), which requires certain actions to be taken if the cost of a defense acquisition program rises above certain thresholds?

- How might the increase in LCS unit procurement costs affect the number of LCSs that the Navy can afford to procure each year, and the total number it can afford to procure over the long run?

- Is the Navy financing cost growth on LCS sea frames by reducing funding for the procurement of LCS mission packages? For example, is cost growth on LCS sea frames linked in some way to the reduction in the planned number of LCS mission packages from an earlier figure of 90 to 110 to the current figure of 64? If the Navy is financing cost growth on LCS sea frames by reducing funding for the procurement of LCS mission packages, how might this reduce the capabilities of the planned 55-ship LCS fleet?

- In light of the cost growth, is the LCS program still cost-effective? For follow-on LCSs, what is the unit procurement cost, in FY2008 dollars, above which the Navy would no longer consider the LCS program cost-effective?

- If Congress had known in 2004, when it was acting on the FY2005 budget that contained funding to procure LCS-1, that LCS sea frame unit procurement costs would increase to the degree that they have, how might that have affected Congress's views on the question of approving the start of LCS procurement?

- How might the increase in LCS unit procurement costs affect the affordability and executability of the Navy's overall shipbuilding program?[23]

- What implications, if any, does the increase in LCS unit procurement costs have for estimated procurement costs of other new Navy ship classes?[24]

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[23] For a discussion of the potential affordability of the Navy's overall shipbuilding program, see CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke.

[24] On this point, CBO testified in March 2008: "The relatively simple design of the LCS and the substantial cost increases that have occurred in the program suggest that the Navy may also have trouble meeting its cost targets for the larger, much more complex surface combatants in its shipbuilding plan, such as the DDG-1000 and the CG(X)." (Statement of Eric J. Labs, Senior Analyst, [on] Current and Projected Navy Shipbuilding Programs, before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, U.S. House of Representatives, March 14, 2008, p. 24.)

Total Program Acquisition Cost

Although this CRS report estimates that a 55-ship LCS program with 64 mission packages might have a total acquisition cost of roughly $29.6 billion, the potential total acquisition cost of the LCS program is uncertain. Supporters could argue that total program acquisition cost will become clearer as the Navy works through the details of the program. Critics could argue that a major acquisition program like the LCS program should not proceed at full pace until its potential total acquisition costs are better understood.

Procurement Cost Cap

Unlike cost caps for certain other Navy shipbuilding programs that Congress has established in recent years, the amended cost cap for the LCS program (Section 125 of the conference report [H.Rept. 110-477 of December 6, 2007] on H.R. 1585, the FY2008 defense authorization bill, which was enacted as H.R. 4986/P.L. 110-181 of January 28, 2008) does not include a provision allowing the cost cap to be increased over time in response to inflation. The Navy testified in February 2008 that it anticipates asking Congress at some point to amend the cost cap to permit the cap to be adjusted over time for inflation.[25]

Technical Risk

Seaframe. Regarding technical risk in developing the LCS seaframe, GAO reported in March 2008 that:

> The Navy identifies a total of 19 critical technologies across both LCS seaframe designs. Fifteen of these technologies are fully mature, and another 2 technologies are approaching maturity. Two other technologies — the overhead launch and retrieval system in the Lockheed Martin design and the aluminum structure in the General Dynamics design — remain immature.
>
> The Navy has identified the watercraft launch and recovery concept as a major risk to both LCS seaframe designs. This capability is essential to complete anti-submarine warfare and mine countermeasures missions planned for LCS. According to the Navy, industry watercraft launch and recovery designs are untested and unproven. To mitigate this risk, the Navy is conducting launch and recovery modeling and simulation, model basin testing, and experimentation. The Navy is encouraging the LCS seaframe industry teams to adopt similar approaches. Final integration of watercraft to each LCS seaframe design is not expected until the third quarter of fiscal year 2009 — after the Navy has accepted delivery of the first two LCS seaframes.
>
> In addition, while the Navy has identified the aviation landing/retrieval system as a mature technology, it is concerned that this system may not be qualified for use on the Lockheed Martin seaframe and may, in fact, result in

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[25] Source: transcript of spoken remarks of Allison Stiller at February 27, 2008 hearing on Navy shipbuilding before the Defense subcommittee of the House Appropriations Committee.

damage to aircraft. The Navy has developed a system qualification and certification plan to mitigate this risk and intends to conduct pierside testing and training of the aviation landing/retrieval system in the first quarter of fiscal year 2009.[26]

Antisubmarine Warfare (ASW) Module. Regarding technical risk in developing the antisubmarine warfare (ASW) module for the LCS, GAO reported in March 2008 that:

> As the delivery of the first anti-submarine warfare mission package approaches, the critical technologies and design both continue to mature. The program office identified 12 technologies as critical for this package, 5 of which remain immature. A production representative, deployable package will not be delivered until fiscal year 2011. The program tracks design drawings for only those portions of mission systems that require alteration to deploy from LCS, as well as those for the containers in which mission systems are stored and transported. The design was not complete at critical design review. Neither the critical technologies nor the design of this package are expected to be fully mature until after they have been demonstrated as prototypes aboard the second LCS ship. The program office does not currently track critical process control data or use other production metrics.[27]

Mine Countermeasures (MCM) Module. Regarding technical risk in developing the mine countermeasures (MCM) module for the LCS, GAO reported in March 2008 that:

> Technologies used in the MCM package are all mature or approaching maturity. However, delays in testing some airborne systems from the MH-60S helicopter — due to both integration challenges and competing fleet demands for the MH-60S — may delay the fielding of some MCM systems to later packages. Some systems in the MCM package were initially developed for fielding on other ships, and the Navy is redesigning them to accommodate launch and recovery systems planned for LCS. The MCM package design is not yet stable; at the design readiness review, only 47 percent of design drawings were releasable. The program does not track production metrics and is relying on test results using ships other than LCS to inform full-rate production decisions.[28]

Surface Warfare (SuW) Module. Regarding technical risk in developing the surface warfare (SuW) module for the LCS, GAO reported in March 2008 that:

> The program office identified four critical technologies for the SuW mission package, three of which are mature. A production representative, deployable package will not be delivered until fiscal year 2011. The non-line-of-sight missile system is not mature and the program relies on the Army to develop that system. Design of the SuW mission package is tracked in a unique manner, as many of the technologies are complete systems in

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[26] Government Accountability Office, *Defense Acquisitions[:] Assessments of Selected Weapon Programs*, GAO-08-467SP, March 2008, p. 118.

[27] Ibid, p. 119.

[28] Ibid, p. 121.

themselves. The program office tracks only the changes to those systems needed to interface and deploy with LCS. Design completion of the SuW mission package has been delayed due to the immaturity of the missile system and funding issues for the 30 mm gun. The program office does not currently track critical process control data or other production metrics.[29]

Operational Evaluation and Competition for Production

As mentioned in the Background section, although the Navy intends to conduct an operational evaluation to support the selection of a single LCS design to be procured in FY2010 and beyond, the Navy also stated in an August 2007 report to Congress on the LCS program that it may "elect to continue production of both seaframes should each design present a unique operational advantage."

Depending on how LCSs procured in FY2008 and FY2009 are awarded between the two competing industry teams, a couple of LCSs might be built to the design that is not chosen by the Navy as a result of the operational evaluation. Compared with the LCSs built to the winning design, these other LCSs will likely have some unique operation and support (O&S) costs. The Navy could choose to operate these ships with their unique O&S costs, sell them to foreign buyers, or modify their combat systems or other features so as to make them more like the Navy's other LCSs in terms of their O&S requirements.

Potential oversight questions for Congress include the following:

- How does the Navy intend to conduct the operational evaluation of the two LCS designs?
- Does the Navy's schedule provide enough time to evaluate LCS-1 and LCS-2 adequately before making a decision on which design or designs to build in FY2010 and beyond?
- What are the potential comparative production and life-cycle operation and support (O&S) costs of procuring a single design vs. procuring both designs in FY2010 and beyond?
- What unique operational advantages might each design have, and how would these advantages compare to the additional costs of keeping both LCS designs in production in FY2010 and beyond?
- If firms that designed the winning LCS design are not among those selected to build it, what message might that send to industry regarding stability in Navy shipbuilding plans, and the potential benefits of investing industry funds in the design of Navy ships, and in facilities to produce them?

[29] Ibid, p. 123.

- When does the Navy anticipate being able to report to Congress on its strategy regarding LCSs built to a design that is not chosen by the Navy as a result of the operational evaluation?

Proposed Common Combat System

As mentioned in the Background section, the Navy testified in July 2007 that it wants to shift to a common, government-furnished combat system for LCSs procured in FY2010 and beyond, and proposed to begin work on the common combat system in FY2007 using some of the prior-year LCS program funding that it had requested Congress to reprogram. Some observers believe that the common combat system amounts to a new start (i.e., starting a new acquisition effort), and that new starts should not be initiated through a reprogramming of prior-year funding, since that can bypass the normal process for Congress to fully review a proposed new start prior to deciding whether to grant initial approval for it. The Navy argued that the common combat system would not amount to a new start because the effort would simply replace unique components of the two existing contractor-furnished combat systems with a single set of combat system components. Potential oversight questions for Congress include the following:

- What are the potential costs and operational benefits of maintaining one or both of the current contractor-furnished combat systems vs. shifting to a common, government-furnished combat system?

- Does the Navy's plan to shift to a common, government-furnished combat system amount to a new start, and if so, would it be acceptable to fund that new start with reprogrammed prior-year funds?

Coordination of Sea Frames and Mission Packages

The termination of construction of LCSs 3 through 6 reduced the number of LCSs that will be delivered to the fleet over the next few years. This, in turn, could reduce the number of LCS mission packages the Navy will need to have in inventory in the near term. This raises a potential oversight issue for Congress regarding whether the Navy's planned schedule for procuring LCS sea frames is properly coordinated with its planned schedule for procuring LCS mission packages.

On the issue of coordination of sea frames and mission packages, an October 2007 GAO report stated:

> The Navy has made progress developing individual mine countermeasures systems and the Littoral Combat Ship.... However, significant challenges remain to fielding new capabilities.
>
> • Operational testing plans for four systems in limited production will not provide a complete understanding of how the systems will perform when operated from the Littoral Combat Ship. Other ships will be used in testing to inform full-rate production decisions on the individual systems. While other ships may serve as platforms for the anti-mine systems, the Littoral Combat Ship

is their primary platform, and it will have different launch, recovery, and handling systems. In addition, Navy plans call for testing these systems in smooth, uncluttered environments, although operating environments are expected to be less favorable.

• The first two Littoral Combat Ships have encountered design and production challenges. Costs are expected to more than double from initial estimates, and the Navy anticipates lead ship delivery nearly 18 months later than first planned. This may slow the planned transition from current mine countermeasures platforms.

• The Navy has reduced its investments in intelligence preparation of the environment capabilities — including the capability to locate and map minefield boundaries — even though improvements in this area could reduce mine countermeasures mission timelines by 30 to 75 percent. These capabilities are especially important for the Littoral Combat Ship, as it must stand clear of suspected minefields.

The Navy has refined its concepts of operation for the Littoral Combat Ship, increasing awareness of operational needs. However, the Navy has not yet reconciled these concepts with the ship's physical constraints, and the trade-offs involved ultimately will determine the ship's capabilities. For example, operation of mine countermeasures systems is currently expected to exceed the personnel allowances of the ship, which could affect the ship's ability to execute this mission. In addition, the Littoral Combat Ship will have only limited capability to conduct corrective maintenance aboard. However, because the Navy recently reduced the numbers of certain mission systems from two to one per ship, operational availability for these systems may decrease below current projections. Moreover, the mine countermeasures mission package currently exceeds its weight limitation, which may require the Navy to accept a reduction in speed and endurance capabilities planned for the Littoral Combat Ship. It is important that the Navy assess these uncertainties and determine whether it can produce the needed mine countermeasures capabilities from the assets it is likely to have and the concepts of operation it can likely execute.[30]

See also the earlier section on technical risk in the LCS program.

Options for Congress

A primary issue for Congress in 2008 is whether to approve, reject, or modify the Navy's restructured LCS program as presented in the proposed FY2009 budget. Potential options for Congress include but are not limited to the following:

- **FY2009 budget request.** Congress could approve, reject, or modify the Navy's FY2009 budget request for the LCS program in areas such as research and development funding, sea frame procurement, or mission package procurement.

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[30] Government Accountability Office, *Defense Acquisitions[:] Overcoming Challenges Key to Capitalizing on Mine Countermeasures Capabilities*, GAO-08-13, October 2007, summary page.

- **Operational evaluation and production competition.** Congress could establish terms and conditions for the LCS operational evaluation and the subsequent production competition.

- **Reporting requirements.** Congress could impose new reporting requirements for the program so as to facilitate congressional oversight on issues such as cost growth.

Some observers, including some Members of Congress, have expressed interest in the idea of using common hulls for Navy and Coast Guard ships, so as to improve economies of scale in the construction of these ships and thereby reduce their procurement costs. In earlier years, this interest focused on using a common hull for the LCS and the Offshore Patrol Cutter (OPC), a cutter displacing roughly 3,000 tons that is to be procured under the Coast Guard's Deepwater acquisition program.[31] More recently, this interest has focused on using a common hull for the LCS and the National Security Cutter (NSC), a cutter displacing about 4,300 tons that is also being acquired under the Deepwater program.

In January 2008, it was reported that Northrop Grumman, the builder of the NSC, had submitted an unsolicited proposal to the Navy to build a version of the NSC for the Navy as a complement to, rather than a replacement for, the LCS. One press report stated:

> Northrop Grumman Corp said on Wednesday [January 16, 2008, that] a proposal to turn its 418-foot Coast Guard cutter into a new class of Navy frigates is sparking some interest among U.S. Navy officials and lawmakers.
>
> Northrop is offering the Navy a fixed price for the new ship of under $400 million and could deliver the first one as early as 2012 to help out with maritime security, humanitarian aid and disaster response, among other things, said Eric Womble, vice president of Northrop Grumman Ship Systems.
>
> So far, the officials briefed have found Northrop's offer "intriguing," Womble told Reuters in an interview. "They like the fact that we're putting an option on the table. No one has told us, 'Go away, don't come back, we don't want to hear this'," Womble said.
>
> At the same time, the Navy says it remains committed to another class of smaller, more agile ships — the Littoral Combat Ships (LCS) being built by Lockheed Martin Corp (LMT.N: Quote, Profile, Research) and General Dynamics Corp (GD.N: Quote, Profile, Research) — amid huge cost overruns.
>
> "There currently is no requirement for a frigate," Navy spokesman Lt. Clay Doss said. He said the Navy and Coast Guard had discussed a common hull during the initial stage of the LCS competition, but agreed that was "not a likely course of action due to the unique mission capabilities."

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[31] For more on the Deepwater program, see CRS Report RL33753, *Coast Guard Deepwater Program: Background, Oversight Issues, and Options for Congress*, by Ronald O'Rourke.

> For now, he said the Navy was proceeding as quickly as it could with the 55-ship LCS program as well as design work on a new DDG-1000 destroyer, and a planned cruiser, CG-X....

The report also stated:

> Virginia-based defense consultant Jim McAleese said the fixed-price offer could be good news for the Navy, which has typically borne the risk of cost-based shipbuilding contracts.
>
> "That is a potential catalyst that could have a huge impact on the way the Navy buys small- and mid-sized surface combatants," McAleese said.
>
> Northrop says its new Coast Guard cutter also experienced some cost growth, but says that was mainly due to requirements added after the Sept. 11, 2001, hijacking attacks. The first of the new ships is due to be delivered to the Coast Guard in March, followed by one ship annually over the next few years.
>
> Northrop said it could offer the Navy a fixed price on the frigate because design work on the ships is already largely completed. Its price excludes government-furnished equipment that would still have to be put on board.
>
> "We're not advocating an LCS replacement," said spokesman Randy Belote. "But after listening to the Navy leadership and studying the new maritime strategy, we think we can get hulls and capabilities into the water at a much faster pace."
>
> Womble said Northrop analysts and an outside consultant studied the Navy's needs and concluded the Navy could use another ship that can operate in shallow water, be forward deployed, has the range and endurance to operate independently, and can work with U.S. allies, if needed.

The press report also stated:

> The proposed ship can be deployed for 60 days without new supplies, has a range of 12,000 nautical miles, and can travel at 29 knots, fast enough to keep up with other warships. That compares to 20 days and a range of 3,500 miles for LCS.
>
> Northrop began sharing a PowerPoint presentation about the proposal with Navy officials and lawmakers at the end of December, and has already met with several senior officials, including Chief of Naval Operations Adm. Gary Roughead.
>
> It could deliver the first frigate by 2012, if the Navy was able to add $75 million for long lead procurement items into the fiscal 2009 budget proposal to be sent to Congress next month, Northrop said.
>
> The frigate is about 75 percent compliant with special requirements that apply only to U.S. Navy ships. Northrop said it believed it could qualify for

waivers on the remaining 25 percent because similar waivers were granted in the past.[32]

Another press report stated:

The U.S. Navy is stumbling to build the ship it wants — the Littoral Combat Ship (LCS) — so shipbuilder Northrop Grumman is urging the service to turn to a ship it can get sooner and cheaper: a patrol frigate version of the Coast Guard's National Security Cutter (NSC).

"We have listened to what the Navy has said — to be more efficient, be innovative and produce affordable and capable ships," said Phil Teel, president of Northrop's Ship Systems sector. "The patrol frigate is a response to that, and to the Navy's new National Maritime Strategy."

Northrop's analysts have studied remarks and themes oft repeated by senior Navy leaders and concluded a de facto requirement exists for a frigate-size ship capable of handling a range of low- and mid-intensity missions. Those missions, said Eric Womble, head of Ship Systems' Advanced Capabilities Group, are detailed in the Navy's new Maritime Strategy and include forward presence, deterrence, sea control, maritime security, humanitarian assistance and disaster response.

"You don't want a high-end Aegis ship to handle those missions," Womble said, "you want something cheaper and smaller."

The National Security Cutter (NSC) as configured for the Coast Guard could easily handle those roles, Womble said.

The first NSC, the Bertholf, successfully carried out its initial trials in early December and will be commissioned this year by the Coast Guard. Womble said a Navy version would avoid the first-of-class issues that have plagued numerous Navy programs, including both designs being built for the LCS competition.

Northrop in late December began briefing select Navy leaders on its unsolicited proposal. The company is taking pains to avoid presenting the ship as an LCS alternative, instead calling it an LCS "complement," which is being built under a competition between Lockheed Martin and General Dynamics.

Key features of Northrop's concept are:

— The ship is based on a proven design already under construction.

— The NSC's weapons, sensors and systems already have a high degree of commonality with Navy systems, increasing affordability.

— While the NSC is 15 knots slower than the 45-knot LCS, the cutter can stay at sea up to two months, much longer than the LCS.

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[32] Andrea Shalal-Esa, "Northrop Offers US Navy New Ship For Fixed Price," *Reuters*, January 17, 2008.

The report also stated:

> Northrop is claiming it can deliver the first ship at the end of 2012 at an average cost of less than $400 million per ship, exclusive of government-furnished equipment, in fiscal 2007 dollars. That's close to the $403 million contract cost of the third NSC, which incorporates all current design upgrades.
>
> A major element of Northrop's proposal, Womble said, is that the Navy should make no changes to the current Block 0 design. "That's the only way we can deliver the ship at this price."
>
> The design, however, has plenty of room for upgrades, Womble claimed, and Northrop is proposing future upgrades be handled in groups, or blocks, of ships, rather than modifying individual ones. Those upgrades could include non-line-of-sight missiles, SeaRAM missile launchers and more capabilities to handle unmanned systems. The design even has room for an LCS-like reconfigurable mission area under the flight deck, he claimed.
>
> Northrop admits the ships are deficient in one significant Navy requirement: full compatibility with the Naval Vessel Rules (NVR), essentially building codes developed by the Naval Sea Systems Command and the American Bureau of Shipping. The belated application of the NVR to both LCS designs was a major factor in the cost growth on those ships.
>
> Most of the NSC design already is NVR-compatible, Womble said, but upgrading the entire design to NVR standards would involve a fundamental redesign and eliminate the proposal's cost and construction time attributes.
>
> "We'd need a waiver [from the NVR rules] to make this proposal work," he said.
>
> Navy Response: 'No Requirement'
>
> The official response from the Navy to Northrop's proposal so far is unenthusiastic.
>
> "There is currently no requirement for such a combatant," said Lt. Clay Doss, a Navy spokesman at the Pentagon. The Navy's other surface ship programs, he said, "address specific requirements."
>
> Doss did note that "the Navy and Coast Guard have considered a common platform for the LCS and the Coast Guard's National Security Cutter. However, due to the unique mission requirements of each service, a common hull is not a likely course of action."

The report also stated:

> Problems with the LCS have caused some observers to predict the program's demise, but the Navy "is completely committed to the LCS program," Doss said. "We need 55 Littoral Combat Ships sooner rather than later, and we need them now to fulfill critical, urgent war-fighting gaps."

Northrop however, is not alone in proposing the NSC as an LCS alternative. Coast Guard Capt. James Howe, writing in the current issue of the U.S. Naval Institute's Proceedings magazine, is urging Navy leaders to consider the NSC.

"I think the Navy should look at it," he said Jan. 10. "Northrop is building a naval combatant here. It has standard U.S. Navy weapon systems as part of its packages. Its communications are interoperable. It can handle underway replenishment. If there's a possibility it could be a cost saver or a good deal for the Navy, it needs to be explored."

Howe, who said he was unaware of Northrop's patrol frigate proposal, agreed the NSC is capable of further enhancements. "There's a lot of space on that ship," he said.

'Potential Game-changer'

Northrop likely is facing an uphill battle with its patrol frigate, as the Navy culturally prefers to dictate requirements based on its own analysis.

But the Navy is having trouble defending the affordability of its shipbuilding plan to Congress and bringing programs in on budget. One congressional source noted the service "can't admit their plan won't work." An unsolicited proposal, the source said, "opens the way for someone else to come up with a potential game-changer."

Northrop's plan, the source said, may be an unexpected opportunity.

"Northrop is listening to the people who have been criticizing the Navy's shipbuilding plan," the source said. "They've gotten a sense that maybe the Navy is looking for a solution, and the Navy can't produce a solution because it might be too embarrassing."

One more aspect that could be at work in the Northrop proposal: "I think there's something coy going on here," the source said. "They may be promoting this as an LCS complement, but their idea might be part of a strategic plan to replace the LCS."[33]

FY2009 Legislative Activity

The Navy's proposed FY2009 budget was submitted to Congress in early February 2008.

[33] Christopher P. Cavas, "Northrop Offers NSC-Based Vessel To Fill LCS Delays," *Defense News*, January 14, 2008.