

U.S. Adm. Vern Clark, the chief of naval operations, made ship cost growth a centerpiece of congressional testimony this year. To the Senate Armed Services Committee, he stated, "Among the greatest risks we face is the spiraling cost of procurement for modern military systems, and shipbuilding is no exception. When adjusted for inflation, for example, the real cost increase in every class of ship that we have bought since I was an ensign has been truly incredible."

Within this testimony, Clark pointed to cost growth that exceeded inflation by more than 100 percent (doubling) for aircraft carriers, destroyers and amphibious ships from 1967 to today. For submarines, the growth is cited as 400 percent. Washington buzz picked this up. Rep. Duncan Hunter, R-Calif., commented "that, even counting inflation, ships today are costing four times as much as they did not many years ago."

While these figures might seem "truly incredible," grapevine simplicity overlooks a complicated set of issues.

For example, over the past 40 years, production quantity has been radically

reduced. In 1967, the U.S. Navy bought 40 ships. In 2005, eight. For fiscal 2006, the Navy plans to buy just four. Thus, 38 years have passed, and the Navy plans to buy just one-tenth the hulls. This will only change through congressional action.

While quantity dropped, quality vastly improved. Tonnage provides a (poor) surrogate for starting the discussion on quality. Virginia-class submarines, at 7,700 tons, are 60 percent larger than Sturgeons (4,800 tons). LPD-17s, at 28,000 tons, are 60 percent larger than LPD-4s (17,000 tons).

At 98,235 tons fully loaded, CVN-76 Ronald Reagan is less than 10 percent heavier than CVN-68 Nimitz's 91,700 tons. This additional weight comes from the incorporation of 40 years of advances in information and other technologies.

For example, Nimitz entered the fleet with six 360-ton (or 2,160 tons) air-conditioning plants while Reagan has more than twice the capacity (eight 600-ton plants, or 4,800 tons) to cool those new electronics.

In comparison with their 1960s predecessors, all 2005 ships have significant improvements in war-fighting capability, survivability, habitability, sustainability and maintainability.

Changed accounting rules and government-industry relationships and responsibilities also make it difficult to determine whether 1967 and 2005 figures represent the same costs. While it might be misleading to compare acquisition costs, focusing on acquisition can mask the very serious issue of total ownership cost (TOC). Often, especially with systems that have a long life expectancy, higher acquisition costs lead to lower TOC.

With the LPD-17, for example, better materials are being used throughout the ship that will enhance war-fighting capabilities and reduce maintenance requirements. To take a seemingly mundane example, LPD-17s will have composite decking rather than wood in the well-deck area. This composite will not rot or contribute to rusting of the hull, nor will it splinter and injure a sailor.

The LPD-17's composite antenna masts will lead to more reliable radar systems, and reduce radar-cross section and maintenance requirements.

For the CVN-21, manpower reductions will cut crew costs by more than \$130 million per year compared with Nimitz-class carriers, or roughly \$6.5 billion over the ship's life cycle. New materials, design enhancements and automation allows for crew reduction.

As all this suggests, focusing on the hull's acquisition cost does not account for quality issues, especially war-fighting capability, which is difficult to measure with green eye-shade accounting. The U.S. Navy's fleet has dropped by half in the last 15 to 20 years, yet all Navy leaders will state that today's fleet is far more capable.

This suggests a capability growth of more than 100 percent. If capability has grown by over 100 percent in 20 years, how much has it grown in 40 years? With this perspective, we might wonder whether 100 percent cost growth should be of less concern if quality has improved by several hundred percent.

This is not to say that ship costs are not a valid item for discussion, but these issues suggest a more complicated environment than a few simple graphics might otherwise suggest.

First, we need a better understanding of actual cost growth and its components. Initial analysis suggests that — counterintuitive to many initial impressions — shipyards are responsible for only a portion of this cost growth. With Nimitz-class aircraft carriers, there was, after accounting for inflation, a 20 percent increase in contract price between CVN-68 Nimitz and CVN-76 Reagan, even though the latter's work package was significantly more complex. This seems a low real-cost increase despite increasingly restrictive (and costly) environmental regulations, skyrocketing health insurance costs and other significant factors.

Thus there remains uncertainty as to why ship costs are increasing. When we know what factors drive ship cost growth, we will have the basis for moving to the truly critical question: How can the nation make the system

work better? Here are some potential partial answers.

- **Reduce churn:** The Navy's shipbuilding plan has had major (often multiple) changes every single year this decade. The uncertainty and churn inhibits effective program, cost and investment management.
- **Altered financing:** The current full-funding policy distorts Navy shipbuilding plans and inhibits cost-effective management. If the Pentagon was more business-like and treated ships, with life-cycles of up to five decades, like capital investments, the Navy could make more efficient use of its resources through a steadier shipbuilding investment stream.

There is no single cause of ship cost growth. There will be no silver bullet solution. Government and industry must work together to find mutually acceptable fixes to change the equation. In the meantime, if someone says "ships are costing four times as much," ask them what they mean.

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