

**Consortium provides General Dynamics with systems and software infrastructure**  
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### **Defense Systems**

Structured within the Information Systems and Technology (IS&T) sector, General Dynamics Defense Systems (GDDS) is a recognized leader in software development and electronics systems design and integration for both commercial and military customers.

The largest GDDS program is the development of fire control and guidance systems for the sea-launched ballistic missile (SLBM) Strategic Weapon System aboard the Trident submarine fleet, the U.S. Navy's strategic nuclear deterrent platform.

"One of our biggest challenges on the Trident program is ensuring the continued viability of the platform throughout its lifespan, while evolving system capabilities through the insertion of new technology," says Mike Tweed-Kent, Vice President of Engineering. Like many defense platforms, Trident has seen exponential growth in its software content, particularly as more functions become software-driven and as commercial off the shelf [COTS] products are used to lower development costs.

### **COTS Integrators**

GDDS first began incorporating COTS elements to meet customer needs in the early 1990's. With the extensive experience it has since gained in COTS integration, GDDS is now able to develop a fire control system upgrade-at more than a million lines of code, essentially a replacement of the Trident II fire control software suite-in half of the time required to deliver the currently deployed Trident II fire control system. The first major system upgrade goes into full production later this year, and will be implemented throughout the Trident fleet in 2002 and 2003.

"With a mission second to none in criticality, this upgrade represents a significant COTS integration challenge," says Tweed-Kent. "Our solution represents many lessons learned over the last ten years, and also results from our customer's early support of the COTS approach. We've had to develop strategies to keep the system 'current' over its lifespan by incorporating continuous technology advances-while also achieving significant reductions in lifecycle costs, while increasing system performance. We consider this program to be a case study in reducing development-to-deployment times through integrated processes and successful COTS integration."

Ed Zeller, GDDS Director of Software Engineering, highlights the business necessity of using software to evolve both new and legacy functions onto upgraded platforms. "With fewer new program starts, the Trident program is representative of today's typical large system," he says. "Our challenge is to re-architect these systems so we can evolve them and maximize pull through of our legacy investment. Flexible system and software architectures-allowing for adaptable growth and promoting the reuse of system components-are key to being able to introduce new technologies while minimizing impacts to the systems and software design."

Defense Systems' use of advanced processes; leveraging commercial standards and COTS products; applying lessons learned; maximizing reuse of system and software components; and other factors have collectively contributed to significant reductions in development-to-deployment time on the Trident upgrade.

"It took six years to develop Trident II in the 1980s," Tweed-Kent says, "and we'll complete the current upgrade development, which is equivalent in functionality and complexity to the Trident II, in less than three years. Both development and life cycle costs have been reduced significantly for the fire control program, and at the same time we're delivering systems to our customer twice as fast as before."