



Greater Combat Effectiveness



I recently attended a briefing given by an F-16 pilot who had flown many missions in Operation Iraqi Freedom. He could not have been more complimentary of the group of software managers and engineers that he was addressing. As he mentioned numerous times, he flies the planes but it is the engineers who are designing and coding the software that in turn enables him to do his job better and put “bombs on target.”

As a software engineer, it is easy to get immersed in the nitty-gritty programming aspects of your job and lose sight of the bigger picture. In this month’s issue, we highlight the bigger picture of how software plays an ever-increasing role in the U.S. military’s combat effectiveness.

In *Software Wars* by Susan Weaver, we begin with a look at how software has evolved to become a key enabler for the Navy’s dual-role F/A-18 Hornet aircraft. This article describes the increased capability made possible through the software of onboard systems such as the dual-role radar, heads-up and heads-down displays, weapon delivery systems, and the avionics digital multiplex bus architecture.

Next, in *Tomahawk Cruise Missile Control: Providing the Right Tools to the Warfighter* by Marcus Urioste, the Tactical Tomahawk Weapon Control System (TTWCS) is described. The TTWCS program enables a reduction in the Tomahawk timeline by placing the missile’s mission planning function aboard the firing unit. This article discusses this major software-based reengineering upgrade program aimed at bringing more capability to officers and sailors onboard U.S. surface ships and fast attack submarines.

Software also plays a key role in the move toward a joint net-centric warfare capability. As an information infrastructure, the Global Information Grid (GIG) will improve data routing and shared situational awareness. In *Service-Oriented Architecture and the CAISR Framework*, Dr. Yun-Tung Lau presents a modeling approach that has been applied to the architecture development of Net-Centric Enterprise Services (NCES). The NCES provides the core enterprise services supporting various communities of interest to the GIG.

In our Software Engineering Technology section, we bring you three articles that describe technology advancements to further sharpen the software edge. First, in *Executable Specifications: Language and Applications* by Dr. Doron Drusinsky and Dr. J.L. Fobes, a formal method of verification is described that can be applied to requirements simulation before software implementation, as well as to a variety of other defense applications to ensure safety and security. Second, in *Executable and Translatable UML* by Stephen J. Mellor, learn the fundamental ideas behind Executable and Translatable UML and how it works in practice to accelerate development and improve the quality of systems. Many senior level managers rely on project managers to present pertinent measurement data that enables the decisions they make. In *What You Don’t Know Can Hurt You*, the third article in this section, author Douglas A. Ebert provides helpful questions for senior managers to ask their project managers to ensure the proper set of metrics is being collected for them to act upon.

Finally, *Identifying Essential Technologies for Network-Centric Warfare* by David Schaar is our Open Forum article that shares this author’s opinion and research on network-centric warfare (NCW). Schaar discusses NCW from its concept definition to its role in the battlespace to the technologies needed to enable concepts, including better awareness of the enemy and friendly forces.

As shown in this set of articles, it is clear that software plays a big role in increasing the warfighter’s combat effectiveness. The F-16 pilot I listened to showed obvious joy in describing what software brings to his job today. I can only imagine what he might be saying about its impact 10 years from now.

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Publisher