



Software Community: Ready for the Challenges of Avionics Upgrade?



One of the major challenges facing the U.S. military is keeping an ever aging fleet of aircraft ready for the fight. While systems remain in the inventory longer, the future vision of warfare demands more information exchange, and integration of more sophisticated weapons. Dynamic updates to mission plans, increased exchange of data from command and control platforms (e.g., Airborne Warning and Control System) and tactical aircraft is on the horizon. This results in increased avionics complexity and system interdependency. At the same time the military is grappling with how to handle hardware obsolescence, which in turn drives software changes. This month's *CROSSTALK* examines the impact on software and the contributions software technology is making to solve the problems. Collectively the articles examine top-level strategy, project planning, software development, and project control.

Jon Ogg, director, Engineering and Technical Management Directorate, Aeronautical Systems Center (ASC) provides an interview on the challenges for avionics modernization and the Air Force's approach to the technology insertion and developing affordable upgrade paths. David G. "Butch" Ardis, ASC's technical director for Avionics, then explains the Air Force's route to migrating toward more open systems, the role of system road maps, and some of the technical challenges. He highlights the importance of improving simulation and support tools for test and evaluation of software, and outlines the Air Force's approach for developing crosscutting solutions and synergy between platforms.

In *Customizing the Software Process to Support Avionics Systems Enhancement*, Roberto Marozza and Dr. Paolo Donzelli show how different approaches such as waterfall, Rapid Application Development, and incremental strategies can be combined and customized to satisfy customer goals within resource constraints.

In *Challenges of Software Certification*, George Romanski examines how software reuse, object oriented technology, and legacy military avionics systems impact the certification process. The Federal Aviation Administration's (FAA's) use of DO-178B as a standard for development and verification of airborne avionics systems and the application to military transport aircraft is an important issue for a number of programs. Incorporating Global Air Traffic Management (GATM), a concept for satellite-based communication, navigation, surveillance, and air traffic management is incorporated into an existing military aircraft is an example of why this is important to the Department of Defense. The FAA and the International Civil Aviation Organization, a special agency of the United Nations, established GATM standards in order to keep air travel safe and effective in increasingly crowded worldwide air space. In most cases, FAA certification was not accomplished on the existing systems, so decisions on the scope of certification activities and the extent of testing became critical.

Lockheed Martin's Richard Conn, Stephen Traub, and Steve Chung reveal their experiences in *Avionics Modernization and the C-130J Software Factory*. The article illustrates the evolution of avionics and how requirements are driving increased complexity and the size of software development activities. The software team's challenges of reuse, process improvement, certification (Capability Maturity Model®, ISO, and the FAA), and culture shift are chronicled.

In *Practical Software Measurement, Performance-Based Earned Value*, Paul Solomon of Northrop Grumman Corporation, discusses his organization's performance measurement techniques.

Due to an overwhelming response of article submittals for this issue, the planned theme for December is "Software Legacy Systems." The issue will address techniques for incremental upgrade of legacy systems, software reengineering, and software emulation among other topics. While the challenges for upgrade of military systems are formidable, it is encouraging to see the innovative response of the software community.

Lt. Col. Glenn A. Palmer
Director, Computer Resources Support Improvement Program