How Wide Open Should 'Open Systems' Be?

In the early 90s, the concept of open systems became prominent. In 1995, the Software Engineering Institute conducted the conference "Open Systems: Promises and the Pitfalls," where basic definitions, elements of an open-systems approach, and reference models and architectures were presented. After six years, study and debate continues in Department of Defense (DoD) circles on implementation of open systems and the road ahead.

From a philosophical standpoint, one can see the origins of a natural tension between those promoting open systems and those who demand interoperability. The open-systems mindset group dreams of using commercial-based components and standard interfaces common across platforms with *plug-and-play* ability. This model is certainly consistent with DoD's drive for a single industrial base and acquisition reform initiatives aimed at affordability. However, interoperability has historically been achieved by imposing standards for products. Programs must weld these sometimes competing initiatives to both achieve affordability through open systems, and to comply with interface standards and conventions necessary for interoperability. This issue provides a topical primer for the uninitiated and some updates and references for those already in the *briar patch* of defining software architectures for real-time defense systems.

In *Joint Technical Architecture: Impact on DoD Programs*, Judy Kerner of The Aerospace Corporation discusses the motivation for the Joint Technical Architecture (JTA) and the role of interface standards and open-systems architectures in achieving interoperability. She contrasts the JTA to the Defense Information Infrastructure (DII) Common Operating Environment (COE), a related initiative with which it is often confused.

Doug Gardner of Defense Information Systems Agency in *The DII COE: Basic Principles and Future Challenges* describes the advantages and challenges of using the DII COE along the lines of its four basic principles: interoperability, security, customer focus, and best value. He also describes challenges for DII COE in the future and describes the widening *expectations gap* by users who see new capabilities in the commercial marketplace that are still years away from being systematically deployed in the DoD.

In *The DII COE: An Enterprise Framework,* Dr. Gregory Frazier describes the history and architecture of DII COE. He observes that the commonality of the COE rests on the fact that mission applications use it to provide common functionality. When segments provide their own implementation of functions already in the COE, no savings due to reduced maintenance, reuse, or technology insertion are achieved. He also describes how systems' compliance with the COE is measured, and outlines the challenges for programs adopting COE.

In *DII COE for Real-Time: Becoming Reality*, members of the DII COE Real-Time Team provide a status on their work to develop a set of extensions to the existing DII COE capabilities. Lt. Col. Lucie M.J. Robillard, U. S. Air Force; Dr. H. Rebecca Callison and Marilynn B. Goo, The Boeing Company; and John Maurer, The MITRE Corporation provide updates on the several real-time products available for use in 2001 that are part of DII COE. These include a configurable real-time kernel that is hosted on operating systems that have scheduling capabilities and services required for real-time applications.

I've heard that most people read magazines from back to front. That may be a good choice in this month's issue. Ingmar Ögren, partner and chairman of the board for Tofs Inc. and Romet, in Sweden, reminds us of the importance of requirements development starting from a systems mission and capabilities. His article, *Mission-Based Incremental Development of C2 Systems for More Efficient Business Support*, describes how to use modeling for incremental development of C2 systems and maintain consistency between system simulations and product design.

We hope this issue of CrossTalk benefits you by capturing the recent history and current state of open and common systems within DoD. We know the future direction is still being charted. The prestigious National Research Council is slated to deliver their findings and recommendations later this year, and the Office of the Secretary of Defense Joint Task Force on Open Systems has several pilot programs and demonstration efforts underway. Look for an article from DoD leadership on future directions for open systems later this year.

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