CrossTalk would like to thank NAVAIR for sponsoring this issue.

So why is this issue of CrossTalk dedicated to the topic of Integration and Interoperability? First we must understand that more and more of the systems fielded by the U.S. Department of Defense (DoD) are more and more by design becoming Systems of Systems (SoSs). This includes weapons systems, command and control systems, large-scale information management systems, just to name a few.

A SoS is different from a single system. It is actually a set of components that when separated are still regarded as systems themselves. This means that each of these individual systems remain operational after the SoS they are associated with is disassembled. Further, each of these individual systems is independently managed. This means they can and do operate as individual entities and this continues regardless of the SoS of which they are a component.

With the idea of a SoS in mind we realize there must be processes and properties defined that allow these individual systems to operate together and exchange information. To this end and of equal importance we must look at Integration and Interoperability.

Starting with Integration we have the processes for creating a larger and more complex entity by combining or adding individual parts. It is a key step during development during which subsystems and other software components are combined. This produces a larger system in which many systems are combined to produce a SoS.

Next is Interoperability as a property of a system or SoS. It refers to the ability to exchange information among many system elements. For SoSs, the needed information exchange is in support of end-to-end SoS capabilities.

The integration process produces an integrated system, meaning that the system's elements must work together to achieve required system functions. These elements working together are then defined as interoperable.

Integration and interoperability are often used somewhat interchangeably, since the purpose of system integration is to achieve a needed degree of information exchange among system components.

Much of the above discussion was taken from the introduction of an SEI Technical Report by Carol A. Sledge, Ph.D.—Reports from the Field on System of Systems Interoperability Challenges and Promising Approaches [CMU/SEI-2010-TR-013].

In this issue of CrossTalk appear several informative articles regarding Integration and Interoperability in various System of Systems.

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