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Developing Common Standards to Improve Interoperability

A DoD Perspective By Mr. Shad Reese

Unmanned Systems (UxS) have become an important and integral component of the U.S. military's warfighting arsenal. Thousands of these systems have been acquired by the Services and employed in combat operations around the globe, but unfortunately, most of these systems were purchased with proprietary control systems. This limits the Department of Defense's (DoD) levels of interoperability and our ability to seamlessly operate, communicate and share critical intelligence across the Joint Commander's battle space. A paradigm shift is needed to push the unmanned systems interoperability envelope by developing common standards and promoting the use of open architecture systems across DoD. Part of this paradigm shift is to develop a strategy that takes a more holistic approach to the standards used to procure and manage UxS across the Department.

Army Aviation's Interoperability

The Army has the largest unmanned aircraft system (UAS) fleet in DoD and as a Service has made progress towards

improving interoperability across its aviation portfolio. The demand for UAS to support ground commander's operations, provide intelligence, surveillance, reconnaissance (ISR), communications relay and network thickening, as well as sharing data/intelligence to the tactical edge of the battlefield continues to increase. This increasing demand throughout the Army's formations led the Army to develop systems that have the highest level of interoperability within DoD. Some examples are:

- Fielding the One System Remote Video Terminal (OSRVT) with extended range bi-directional capability that allows Soldiers at the tactical edge to control the payloads on the Shadow and Gray Eagle aircraft. The OSRVT can receive video and simultaneously transmit commands back to the aircraft to guide the payload's camera to a point of interest.

- The development of the Tactical Open Government Architecture (TOGA) controller for the small UAS systems is near completion. TOGA will allow operators to control all of

the Army's small UAS with a single controller. There is an OSD initiative to determine if TOGA can be the "universal" controller to operate small ground robotics as well as small UAS to aircraft.

- The Universal Ground Control Station (UGCS) is the single ground control station/cockpit for the Army's Group III (Shadow) and larger UAS. The Army's future software improvement efforts for the UGCS will meet Future Airborne Capability Environment (FACE) standards to transition to a modular and open architecture. This will not only lower the implementation, procurement, and system integration costs, but also improve interoperability and support the implementation of the Universal Operator initiative that will enhance UAS warfighter effectiveness.

The Army is also leading the way in the development of Manned Unmanned Teaming (MUM-T) doctrine and capability in DoD. MUM-T effectively combines the strengths of both manned and unmanned aircraft,

enhances the lethality of both, improves effectiveness, increases survivability and in the process provides enhanced situational awareness and greater employment options to the combat aviation brigade commander. To take full advantage of the MUM-T capability, the Army is in the process of embedding RQ-7B Shadow in the heavy armed reconnaissance squadrons and the MQ-1C Gray Eagle in the attack reconnaissance battalions. However, there is much more to MUM-T than assigning aircraft together in the same unit to conduct operations. The Army achieved MUM-T by setting and adhering to a basic set of standards (Interoperability Profiles) and by program managers across the manned and unmanned fleet enforcing those standards within their respective systems.

Interoperability Integrated Product Team Approach

Leveraging the UAS centric approach previously established by the Unmanned Aircraft System Interoperability Integrated Product Team (I-IPT), the I-IPT is now focusing on cross-domain (air, surface, subsurface, and ground) unmanned systems interoperability via common unmanned system operational modes or mechanics of operation. In other words, by virtue of a system being “unmanned,” it must take direction, enact that direction, and provide feedback back to the operator in similar fashion to all other unmanned systems. DoD wants to leverage these similarities to develop a “best of” approach, and leave the unique system domain aspects to each Service program office. This approach could lead to dramatic leaps in interoperability that will increase UxS combat effectiveness and cost saving opportunities for the program managers (PMs).

In addition to this undertaking, the I-IPT plans to initiate a cross-domain gap analysis in FY16 to assess cross-domain interoperability within the Department similar to a capability assessment gap analysis completed three years ago focused on UAS. The cross-domain gap analysis will lay the groundwork for the Department’s development of a core set of unmanned system operational functionality, and examine set standards to support gap closure and cost reduction goals.

An increased emphasis must be placed on the development of standards to guide the development of mission command and control and information exchange software in order to achieve the levels of interoperability for unmanned systems employment demanded by our warfighters. This requires OSD and the Services to collaborate jointly to sponsor and participate in the development of standards with industry.

The use of standards is not new to the Department. All the Services are independently working initiatives to move from legacy proprietary systems to Modular Open System Architecture (MOSA) based systems. The Services’ approaches are similar, but vary slightly, which does impact DoD’s ability to provide the Joint Force commander seamless support using truly interoperable weapons systems. DoD must transition to MOSAs that are based on a set of standards that are flexible enough to allow for Service specific mission applications as well as supporting Combatant Commander’s requirements to fight as a “Joint” force.

The Army has been an active proponent of the standards work being done by both the Future Airborne Capability Environment (FACE) consortium and UAS Control Segment (UCS) Working Group, whose development of the UCS architecture is now under the auspices of the SAE International. Due to the Services cooperation, FACE and UCS began an alignment effort that is now gaining much attention and support from I-IPT.

Conclusion

The Army has made progress towards the development of UxS standards to improve intra-Service interoperability that OSD can learn from as we move forward. This success can be seen in terms of increased warfighter effectiveness, enhanced levels of interoperability and opportunities for cost savings simply by enforcing and employing a common set of standards (Interoperability Profiles). What the I-IPT wants to do is build on the momentum that has been achieved and develop Department-wide standards to increase interoperability across the Services to set the conditions that will allow the conduct of MUM-T across the Joint Force.

The I-IPT going forward will shift focus from UAS centric interoperability to cross-domain approach in an attempt to develop “best of” solutions that improve warfighter effectiveness and reduce Service/system life-cycle costs. It will also champion the development of standards to improve the levels of interoperability across the Services, increase UxS combat effectiveness, and provide the warfighter with the most agile unmanned systems possible. But we must work together on a common set of UxS standards to modernize our legacy proprietary UxS systems. We owe it to our warfighters to provide them unmanned systems that can operate seamlessly and share data across the Joint Commander’s battle space.

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