Operating Next-Generation Remotely Piloted Aircraft for Irregular Warfare

Abstract

The Air Force Scientific Advisory Board's Operating Next-Generation Remotely Piloted Aircraft (RPA) for Irregular Warfare (IW) Study panel focused on RPA mission management. Key components of mission management include human systems integration, distributed systems operations, and command and control. The study considered four primary issues including manning, airspace deconfliction and management, collateral damage, and mission assurance in a contested environment. The panel observed RPA exploiters and maintainers represented 70% of the manning requirements, and exploitation needs are expected to grow. Manually intensive airspace deconfliction and management is inefficient, will not scale, and hampers manned/unmanned integration. Furthermore, inexpensive and proliferating kinetic and electronic threats are an increasing concern for RPAs operating in IW environments. Nevertheless, RPAs help minimize collateral damage through persistence, increased "eyes on target," and use of focused-lethality munitions.

Deliberations resulted in the following top-level findings regarding gaps in current approaches to mission management:

- Insufficient and inflexible platform and sensor automation increase operator workload and limit mission effectiveness.

- Poorly-designed operator control stations (OCS) fail to provide effective, robust, and safe mission management.

- Limited communications fail to provide interoperability, support distributed operations, or account for future scaling issues.

- Undergraduate RPA training and establishment of the RPA career field are positive steps, but crew selection, training, and simulation limitations impact manning, mission effectiveness, and safety.

- Concepts of operations (CONOPS) and tactics, techniques, and procedures (TTPs) are developed after system development and deployment, rather than as a concurrent effort in an "incremental development" program.

Based on these findings, the panel recommends:

- Develop new, multi-level automation to enable situation-adaptive human interaction.

- Improve OCS by applying human engineering standards and best practices to correct existing stations with a future focus on adaptive, mixed-initiative, payload-centric control.

- Develop assured communications, sensitivity-dependent security, and a long-term plan for a unified communications architecture.

- Understand fundamental capabilities and skill-sets required for each RPA specialty and exploit current training and simulation technologies to enhance pilot and sensor operator exposure to contested IW environments.

- Develop RPA CONOPS and TTPs to enable distributed global operations and co-evolve CONOPS/TTPs with system development.

- Appropriately apply advanced concept technology demonstrations to develop prototypes and transition successful projects to the acquisition process, incorporating rigorous systems engineering practices including human systems integration.