Integration of Unmanned Aircraft with Air Traffic Management

Integration of Unmanned Aircraft Systems (UAS) into non-segregated civil airspace presents many challenges for the Federal Aviation Administration (FAA). The MITRE Corporation’s Center for Advanced Aviation System Development (MITRE/CAASD), in collaboration with the FAA’s Air Traffic and Next Generation Air Transportation System (NextGen) organizations, is developing a strategic approach for Air Traffic Management (ATM) for identifying and mitigating current and future operational and technical issues driven by the introduction of UAS into non-segregated civil airspace.

UAS Impact to ATM Operations

UAS operate in the NAS under Certificate of Authorization (COAs). Fully integrating unmanned aircraft into the same airspace servicing 6,000–7,000 flights during busy periods requires a comprehensive strategy to identify and address the operational needs of the air traffic controller and traffic manager. UAS activity is also expected to accelerate quickly and accommodation of that growth requires aircraft certification, safety assessments, NAS automation changes, and decisions on operational policies, procedures, and airspace revisions.

MITRE/CAASD is working with the FAA to assess the potential impacts of UAS integration into the NAS on operational safety and efficiency. UAS perform differently than many aircraft currently operating in the NAS. Differences such as operating speeds, climb/descent profiles, and communication paths and aircraft response latencies are being evaluated to identify changes to policies, procedures, and automation needed to ensure safe and efficient operations.

The modeling, analysis, and simulation capabilities developed by MITRE/CAASD to provide FAA with information to inform many key decisions are being leveraged to provide information needed for UAS decision making. Airspace impact, controller workload, human factors, and human-in-the-loop modeling and simulation are all key elements of the work being performed to assess UAS operational integration issues and needs.

UAS Impact on ATM Automation

In addition to transitioning from the current use of COAs for accommodation of unmanned aircraft under special conditions to a future vision of routine access to non-segregated airspace, the NAS is also transitioning from a legacy infrastructure to NextGen.
Building upon the current NAS infrastructure and simulating the future technical environment in the MITRE/CAASD Integration Demonstration and Experimentation for Aeronautics Laboratory (IDEA Lab), MITRE/CAASD is exploring potential direct links between Air Traffic Control (ATC) automation and UAS Ground Control Stations (GCS).

Figure 3. MITRE/CAASD-Developed Simulation Connects UAS to NextGen's System Wide Information Management (SWIM)