

CONTRIBUTING ORGANIZATIONS

NATO Joint Capability Group UAV

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NATO formed a Joint Capability Group UAV (JCGUAV) within the Council of NATO Armaments Directors in 2006. The JCGUAV includes representatives from 26 countries, including members of NATO, NATO Partners for Peace (PfP), Australia and Israel.

The work of the JCGUAV includes four main goals:

- **Capability Integration for Unmanned Aircraft Systems (UAS)**
This includes new UAV systems for emerging requirements from Micro UAVs to High Altitude Long Endurance (HALE) UAVs, as well as capabilities, such as weapons employment, advanced payloads like ground penetrating radar, options for countering Improvised Explosive Devices (IEDs), and conducting re-supply with UAVs.
- **Advancement of UAS Autonomous Operations**
This includes UAV operator workload reduction, reliability improvements, intelligent decision making and re-planning, air-to-air refuelling, as well as automated launch and recovery operations.
- **Interoperability for UAS**
This includes a functional and technical architecture that will provide options for coordination among systems, including control and integration for coalition operations.
- **Acceptance of UAS within NATO**
This includes airspace integration, working to achieve integration of the systems in the radio frequency spectrum, and acceptance within operational forces command and control schemes and networks.

Organization

The organization of the JCGUAV is shown in figure 1. The four subgroups established within the JCGUAV reflect the areas that the group has agreed to work on together to improve standardization for UAV development. The subgroups include members from government and industry. Within the JCGUAV Program of Work, there are four major efforts aligned with the activity of the subgroups. These efforts together support the development of standards for the UAV acquisition.

Standard Interface for a UAV Control System

The JCGUAV developed STANAG 4586 on Standards Interfaces of UAS Control Systems for NATO UAS Interoperability via a standard set of messages between the air vehicles and the control stations and the control stations and external C4I nodes. Extensive support from industry continues as edition 3 of STANAG 4586 has been released for national review and ratification.

Flight in Non-Segregated Airspace (FINAS)

The FINAS Working Group was formed to recommend and document NATO-wide guidelines to allow the cross-border operation of UAS in non-segregated airspace. A major task for FINAS involves the production and publication of a harmonized UAS airworthiness code known as UAV System Airworthiness Requirements (USAR). Work is undertaken by a team of technical specialists and submitted for ratification as STANAG 4671. The FINAS group has initiated efforts for development of a USAR for UAVs with a mass of less than 150Kg (USAR-Light) and for Rotary Wing aircraft (USAR-Rotary Wing). The group has also completed work on training standards, sense and avoid modeling, and air traffic

management. FINAS initiated a human factors study in 2009. Through operational lessons learned, the FINAS subgroup noted that many legacy UAS Human Factors Interfaces (HCI) were developed without effective Human Factors Engineering, i.e. «they were designed by engineers for engineers». FINAS Study 4685 will address «Application of Human-Interface Engineering for UAV System Design, Mission Effectiveness and Operational Safety».

Interoperable Command and Control Data Link

JCGUAV work includes an interoperable command and control link standard development effort. UAVs typically employ a back up link for command and control, but there is no standardization among data links used for this purpose. NATO STANAG 7085 on a Tactical Common Data Link (TCDL) does provide standardization for the UAS sensor data link, which is also used to exchange command and control messages with the UAS, but this is a high bandwidth data link. Common problems for UAS include spectrum availability and ensuring safety of flight for an unmanned system. A low bandwidth command and control link allows a greater number of systems to be operated within a given bandwidth and provides a means for redundancy in UAS design to meet reliability standards. The JCGUAV began the development of a draft STANAG 4660 for an Interoperable Command and Control Data Link (IC2DL) to meet the need for a low bandwidth command and control link. Agreement among the group was not reached on all the capabilities in the draft STANAG and a national survey was completed to align the requirements. A team from industry, funded through a NATO Industrial Advisory Group (NIAG) Study Group 140, is assessing the alternatives to meet national requirements and update the draft STANAG for approval by the group and ratification by the member nations.

UAV Weaponization

Information exchange briefings have been conducted at the JCGUAV meetings for the concept and application of weapons payloads on UAVs. Several NATO members have these systems in the field and more nations are developing options for this capability. Much of the work that has been completed for the integration of weapons on manned aircraft can apply to UAVs. The subgroup will review unique aspects of arming UAS that would benefit from the development of a standardized approach. This activity is also supported by a NATO funded NIAG study, Study Group 125, with extensive participation from industry.

Way Ahead

The number of UAS in use within NATO member nations and the roles and missions of these UAS will continue to expand. The standards development, undertaken by JCGUAV, and worked in detail within the subgroups, provides a means to develop and share the best alternatives to integrate these systems into operational forces in the numbers required and within the resources available. As more UAS are fielded, the demands on additional capacity within the frequency spectrum for command and control as well as sensor downlink must be met. Airspace integration will remain challenging as UAS operations expand. Cooperation among the members of JCGUAV will help alleviate challenges for safe, effective and reliable operations of these systems.