NATO Research & Technology Organization

By Capt Giovanni Sembenini

The NATO Research and Technology Organisation (RTO) is the primary NATO organisation for defence science and technology. It was formed in 1998 by the merger of the Advisory Group for Aerospace Research and Development (AGARD) and the Defence Research Group (DRG).

The RTO promotes and conducts co-operative research and information exchange, develops and maintains a long-term NATO research and technology strategy, and provides advice to all elements of NATO on research and technology issues. In pursuit of this mission, the RTO operates at three levels – the Research and Technology Board, Technical Panels and Technical Teams - and is supported in its efforts by an executive agency, the RTA.

The total spectrum of R&T activities is addressed by six Technical Panels covering a wide range of scientific research activities, a Group specialising in modelling and simulation, and a Committee dedicated to supporting the information management needs of the organisation.

The scientific and technical work of the RTO is carried out by Technical Teams, created under one or more of these eight bodies, for specific activities which have a defined duration, and comprised of experts from Member nations. Such teams are typically formed as focus groups performing dedicated research activities in their area of scientific expertise. Research activities often involve Task Groups, Workshops, Symposia, Lecture Series and Technical Courses. In all cases, these activities result in the publication of highly valued scientific literature, published by the RTO. The results of the RTO's research can also be found in peer-reviewed journals, and within NATO publications. Since the RTO is the premier NATO body for the advancement of technology and in support of capabilities development for the warfighter, it is deeply and broadly involved in technological research in the field of Unmanned Autonomous Systems. Also according to the most current views within NATO, the work is being done at various engineering levels, but always bearing in mind a capability approach and aiming at maximizing interoperability.

The current RTO portfolio of UAS activities covers qualification issues through the activities of the Task Group (TG) AVT-174 "Qualification and Structural Design Guidelines for Military UAVs". This TG's purpose is to respond to the need to bring new affordable and reliable weapon systems on line rapidly through a quick and thorough assessment of the design space. The TG will produce a recommended set of guidelines for design criteria and structural qualification for unmanned air vehicles tailored to reduce testing requirements timelines. It covers the integration of three sets of topics as they apply to unmanned air vehicle/weapon system design and qualification: General UAV Design Requirements, Structural Design Criteria and Validation Approaches.

It is well known that there is a clear and present need for interoperability of unmanned systems in military domains. TG IST-089 "Applied Interoperability and Autonomy for Military Unmanned Systems" work was initiated to guide researchers and developers towards the real world requirements of the military users and to standardize and harmonize the developments in unmanned vehicles. Special focus is given to the interoperability of the unmanned vehicles, possibly by stimulating the application of existing STANAGs and/or other standards. This activity is also linked to the recurring ELROB, the "Military European Land-Robot Trial (ELROB)".

UAS systems, as we can see in current operations, can also be used in innovative ways. TG HFM-184 "Safe Ride Standards for patient Evacuation Using Unmanned Aerial Vehicles (UAVs)" tackle the apparent lack of an internationally recognized set of "G-force" standards for casualties which can be used in development of flight profiles for UAVs, a special concern since UAVs have the ability to pull G-forces far in excess of any aircraft other than fighters. If UAVs are to be used in a patient evacuation role, it is necessary to have an agreed set of G-tolerance standards for patients which can be incorporated into the Artificial Intelligence Flight Controllers. This TG attempts to develop an evidence-based reference resource which can be used by UAV developers to ensure that the Artificial Intelligence programs used to control UAVs will be able to support the use of these assets in the casualty evacuation role.

The general principle of integrating man and automation technologies for UAV flight is known as supervisory control. The evolutionary or reactive introduction of advancing automation bears the risk of designs overtaxing the human operator due to high complexity issues and information overload, amongst many other human factors related problems. On the other hand, there is demanded a reduction of the operator-vehicle-ratio, in particular in manned-unmanned teaming missions, where the UAV operators may be stationed on airborne platforms. Such ideas are currently being discussed in various NATO forums under the term Manned-unmanned Teaming. LS SCI-208 "Advanced Automation Issues for Supervisory Control in manned/unmanned Teaming Missions" represents the RTO contribution to this subject. This effort is structured as a Lecture Series, which is the typical educational activity carried out by the RTO.

The legacy of AGARD founding father, Dr von Kármán, is alive and well. And in the current climate of global recession his principle of collaborative research is standing the RTO in better stead than ever.

Collaboration allows synergies, so things get done more efficiently and in a more cost effective way. And by having a dynamic network of national experts, well tuned to knowledge and technology evolutions, the RTO will constantly be able to anticipate and help NATO decision makers adapt to evolving challenges.

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