Unmanned Aerial Systems (UAS)
Ground Control Station manning

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"THE MANNING CONCEPT OF UAS GROUND CONTROL STATIONS IS AN ESSENTIAL BUT OFTEN OVERLOOKED ASPECT"

While the pilot has been removed from the aircraft, the human component in UAS operations has only been increased. The successful outcome of a UAS operation requires a team effort. The broad range of R&D NLR provides in the design- and life cycles, training and human factors of Unmanned Aerial Systems (UAS) is focused on addressing this and other problems.

NLR continues its R&D efforts focused on the performance of the personnel involved in UAS operations.

Two interrelated lines of R&D concerning human performance are maintained at NLR. The first line concerns the required competencies of the personnel involved in UAS operations. These competencies play a role in recruitment and selection processes, team composition and training issues. The second line concerns the design of Ground Control Stations (GCS), which resolves the match between human operators and the layout of the human-computer interface (controls, displays, etc.).

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Building the right team for UAS operations

Team composition is the key to successful UAS operations. At NLR, we researched task allocation, i.e. how can tasks best be assigned to team members to ensure safe and efficient flight. This allowed us to conceive how and when team members were best suited for different flight-, air traffic control- and payload-related tasks (focusing mainly on camera control and image processing). Note that only some of the smallest UASs can be operated by a single person. All other UASs need to be operated under a firm and established multi-crew concept. This entails selecting the right team members, defining the appropriate team size and ensuring acceptable task loads and team stability. But is that much personnel really required in order for a UAS to be operated? NLR's research into automation, autonomy and vehicle-to-operator ratio is challenging this assumption. NLR's MUST facility, for example, enables a single operator to control 4 UASs.

Selecting the right team members: Competency profiling

Is operating a UAS similar to flying a manned airplane? Or is operating a UAS more comparable to tactical air traffic control? Or perhaps operating a UAS is comparable to neither of these trades? NLR attempted to answer these questions through extensive experimentations in which candidates were subjected to a battery of tests and subsequently tasked to fly missions on a Predator UAS (one of the UAS simulators at NLR can be configured as a Predator ground control station). The experimental results clearly hinted at distinct competency profiles between personnel flying the vehicle (or supervising multiple vehicles at the same time) and those responsible for the payload (in this case: streaming video).

Developing tailored UAS training

For the National Police Services Agency in the Netherlands, NLR continues to provide basic theoretical and practical courses in UAS operations, approved by the Civil Aviation Authorities of the Netherlands. NLR assisted the Royal Netherlands Army with training at the Platoon level for various types of small UASs. NLR provides a full rotary wing UAS training course for its own personnel operating NLR's Geocopter GC-201. Apart from an actual rotary wing UAS, NLR has several UAS facilities available. The first facility is the Remotely Operated Vehicle Adaptable Training/Tracking Systems (ROVATTS™). ROVATTS is a PC-based simulator that is also used by the USAF for Predator UAS crew training. The second facility is the aforementioned MUST facility, which stands for Multi-UAS Supervision Test bed. MUST is developed by NLR as a reconfigurable generic UAS Control Station simulation facility. These simulation facilities are used for R&D with regards to innovations in (the design of) training. NLR has developed standards for training methods, team performance criteria, performance assessments, and provision of feedback to the team as well as the individual.

Who can benefit?

NLR is eager to use its longstanding experience in the field of UAS to assist military and civil UAS operators and UAS training organisations in devising their recruitment-, selection- and training processes and to provide other related services in this area.

We also offer support during the entire acquisition process of UAS systems. NLR actively assists aviation authorities with rule-making in the field of personnel licensing, operator performance, human factors (e.g. work and rest-times, teamwork, shift-work) and aviation medicine. NLR is also able to assist UAS manufacturers in designing Ground Control Stations as well as developing crew- and training concepts for their UASs. NLR develops Embedded Virtual Simulation that can be appended to actual UAS hardware for cost-effective training. Finally, NLR is in the position to provide R&D capabilities for the benefit of NATO and EDA initiatives.

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