Retrofitting Mission Essential Supplemental Information into existing Ground Control Stations

W. Marshak, J. Collier, D. Bartek, J. Hudson, J. Miles, and **J. Reising** - SYTRONICS Inc.
M. Findler, SYTRONICS, Inc. and Wright State Research Institute

UAV Ground Control Stations (GCS) are built to provide information exchange between an operator and vehicle regarding status and control of the vehicle. Most are not designed to deliver mission essential information about the target, encompassing airspaces, intelligence, weather, friendly units in the vicinity, or threats from other sources. Although this information is critical for both mission effectiveness and for safety of operations, the GCS are not designed to receive and present them.

There are several reasons for the lack of information integration into the GCS. First, information integration would increase the complexity of reliability testing for the GCS software. Absolute functional reliability is a safety-of-flight issue, and has greater implications if the UAV is weaponized. Additionally, most of this information has net-centric sources, so Internet or even SIPRNET connectivity raises security issues that GCS developers simply do not want to confront. To make matters worse, there is no coordinated effort among the information sources to provide a single central information source or to standardize acquisition of information from existing sources. Without such a source or standards, GCS developers simply have no way to design or develop net-centric information into the GCS.

Operators are distant from the developers, and the nuances of architecture and testing issues are remote from their struggle to accomplish their assigned mission. The necessary supplemental information comes over voice communications (radio, phone, intercom), paper products, or supplemental computer displays. In the latter case, existing map and mission planning software is being augmented by piecemeal connections to gerry-rig the information into the GCS. This has resulted in an array of displays managed by the Squadron Operations Center, each carrying part of the necessary information content.

Placing the operator between the net-centric information sources and the GCS may solve the testing and security issues, but at considerable cost to the UAV operators. GCS manufactures are "tap-dancing" the issues associated with this supplemental information, since the organization and understanding this non-GCS sourced information significantly impacts UAV operator workload and effectiveness. The cognitive consequences of this information have been studied and ways of improving information management and assimilation have been developed so that they might be portable to existing and future GCS.

The results of this effort are a single supplemental display system that filters, organizes and displays supplemental information in a timely fashion. This system helps manage the information and UAV operator's workload, stores and retrieves information in a mission effective fashion, and facilitates "testing-safe" information transfers between the supplemental sources and the GCS. The system uses intelligent agents to acquire and organize the information. GCS designers need to adopt a modular design philosophy that accounts for net-centric supplemental information in their GCS layout and embrace incorporation into UAV-GCS operations.