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AFTER LONDON:The role of the Micro Air Vehicle (MAV) in counter-terrorism

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THE LONDON bombings, as in the case of the September 11 attacks in the United States, have painfully revealed one fact – the world needs more than just elaborate defence capabilities to deal with terrorism.

Singapore's own stance in facing terrorist threats stems from the realisation that small states need to concentrate on counter-terrorism while the 'War on Terror' by the US provides the grand strategy to deny 'safe havens' for terrorists. In this respect, the contribution of the technology-driven Revolution in Military Affairs (RMA) should not be underestimated. While it may be an expensive investment for nations with limited defence budgets, RMA can be an effective contributor to dealing with terrorism. One good example is through the use of force miniaturisation such as the Micro Air Vehicle (MAV).

Force miniaturisation

The concept of a smaller and more detachable force provides flexibility in dealing with unconventional launches by terrorist organisations. An aspect of the Singapore Armed Forces' 3G-transformation is to leverage on technology to provide a versatile and sustainable combat force that deals with such threats. Versatility is enhanced by having smaller units which can adapt to changes in the operational environment. Miniature systems are ideal for enhancing a soldier's mobility and adaptability on the battlefield.

The introduction of a new unmanned system, such as the MAV, should help achieve this goal. MAVs are equivalent to mini-drones that can be easily stored, transported and launched. They will come in handy for lower-echelon ground forces conducting forays into restricted premises of the enemies.

Apart from its minute size, MAVs are designed to operate autonomously. As future battles are likely to be conducted in an urban operational theatre, MAVs that can wander into tiny crevices of buildings will allow special forces to more accurately track the locations and hideouts of terrorists. In doing so, they will complement larger Unmanned Aerial Vehicles (UAVs) in the field of reconnaissance and help reduce collateral damage.

To Sense without being 'Sensed'

Unmanned systems have provided the armed forces with the capability to see beyond the

conventional sight of a soldier. Coupled with advanced sensor technology, real-time information can be transmitted via secured networks to a remote user, thus reducing the level of danger by eliminating the need for humans to be present on the battlefield. The Republic of Singapore Navy's recent acquisition of the Unmanned Surface Vessel (USV) is one such device which might enhance our counter-terrorism capabilities.

Singapore's highly urbanised terrains impose technological challenges in the field of surveillance. While UAVs continue to provide a bird's eye view of activities on the island, they would not be able to detect activities of clandestine groups operating inside buildings. While the main services of the SAF have their share of unmanned systems, the special forces of the SAF need to also employ unmanned systems to deal with terrorists who will not hesitate to inflict injuries on civilians. Remote sensing is of vital importance, especially in dealing with terrorists, as unpredictable scenarios require immediate and precise responses.

Terrorists are highly likely to resort to biological and chemical weapons to cause widespread destruction among the public. Furthermore, the ease with which they can be manufactured renders them as attractive weapons for pandemonium. Employing MAVs to track down traces means that contaminated areas can be reconnoitre without risking human lives. The minuscule size of the MAV would allow it to be transported quickly to areas to detect the presence of gases and test the safety of the environment for human operations.

Customised design

Not more than 15cm in its linear dimension, the MAVs can easily take flight from the palm of the user. Such a distinct Vertical Take Off and Landing (VTOL) feature is highly suitable for urban warfare, obliterating the need for a runway. MAVs should be designed for a particular mission and the primary objective could be compromised if it fails to deliver.

The MAV programme conducted at the Defence Advanced Research Projects Agency (DARPA) – the premier defence R&D organisation in the US which supports Singapore's RMA efforts -- focuses on variable technologies that affect flight control, power propulsion and communications. In general, the urban landscape in Singapore does not require MAVs to operate under harsh wind conditions. For the purpose of tracking down suspects in a building, the design should focus on sharp turning radius to negotiate tight bends around corners. The speed of MAVs must be optimised to ensure that picture resolutions are not compromised. Typically, the flight mission could last approximately half an hour – a sufficient timeframe as the engagement of terrorists needs to be executed swiftly.

Cost versus Benefit

Although individual MAVs are designed to be relatively low-cost and easily affordable, analysts have questioned the benefit of its size when its mission could possibly overlap that of existing assets that could perform a similar function. For example, antennas mounted on MAVs would not be of optimal gain owing to their minute sizes. In this context, the SAF will have to consider if it currently possesses assets or capabilities that could perform similar functions.

The SAF's 3G transformation shares the goals of the US military's Joint Vision 2010 of achieving battlespace dominance via information superiority. The sensors installed would allow MAVs to feed back real-time information via networks to the user and the command centre. As such forces are able to manoeuvre more freely in order to cut out possible escape

routes and contain the terrorists within a specific location. Snipers perched at favourable locations can then engage these targets with precision, minimising casualty rates. At the same time, the forces will be better protected if the enemies are engaged with similar accuracy but from greater distances. Finally, the mission will not be hampered by cumbersome logistics as MAVs are easily transportable and deployable.

The advent of MAVs will enhance the individual soldier's fighting capacity against the terrorists. Should we question the price tag of a system that could prolong the survivability of the soldiers as well as the civilian hostages in this case? It would certainly be more costly if such technology is left on the shelf unexploited for urban warfare as a deterrence to terrorist organisations.

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