SMALL AIR FORCES, UAVS AND OPERATIONAL FLEXIBILITY

Over the past few years, Air Force experimentation has shown that a small air force such as the RAAF has to be ultra efficient in the use of its assets in order to be operationally effective. The operational commitments of the RAAF vis-à-vis resource availability is such that it can not afford to be profligate with any of the capabilities or assets at its disposal. An intuitive understanding of this relationship between efficiency and effectiveness has shaped both the Air Force's choice of equipment and employment concepts at the strategic, operational and tactical levels. Following this line of thought, advocates of Uninhabited Aerial Vehicles (UAVs) cite the operational efficiencies to be gained from their use, in conjunction with and as substitutes for manned platforms in many air power roles. The main advantages are listed as the potential savings in operator numbers, and the relative ease with which UAVs can achieve persistence— a characteristic which is in ever increasing demand for ISTAR and engagement tasks alike.

On the face of it, these arguments are sound. Employment of UAVs will ameliorate the problem of wasting precious crew duty time in unproductive transits to and from the operating area, and also negate the need to launch successive waves of manned platforms to maintain a presence, when a single long endurance UAV can remain on-station for 24 hours or more. However, when viewed from a broader systems perspective, these perceived advantages may be more illusory than real—at least for the current generation of UAVs. Furthermore, they may be outweighed by other, more intractable inefficiencies that UAVs bring with them.

It may be a cliché, but in many respects, flexibility is truly the key to air power effectiveness—particularly for a small force such as the RAAF. This is one of the primary reasons why the RAAF force structure has been built around small numbers of highly versatile platform types operated by equally versatile people. It is also why the Air Force has consciously avoided acquiring overly specialised systems that have utility in only limited roles or in a narrow part of the spectrum of conflict. This is the best way to ensure that maximum utility is derived from limited resources.

In the recent past, there has been acceptance of the need for individual platforms to have *multi-role* capabilities. However, the demands of modern warfare now call for assets to possess *swing-role* capabilities in which a platform may be required to perform several different roles within the span of a single sortie. The RAAF F/A-18s were employed in this manner during the recent operations in the Middle-East. It is also the way future forces are being employed in experimental war games.

Predator + GBU 12

In contrast, the current generation of UAVs are generally optimised for a particular role. Even the most flexible of them can perform only a small sub-set of the tasks that could be undertaken by an equivalent manned platform. Under these circumstances the operational efficiencies offered by UAVs are diminished because a greater number of platform types will need to be generated and maintained in the battlespace to cover the range of possible tasking. Further inefficiencies might be incurred because of changing and uneven demands for some air power roles at different phases or in different types of conflict. In such a scenario some elements of the UAV force structure might find itself under utilised whilst others are over stretched.

Many of these problems are being addressed in the ongoing development of more complex UAV designs and the evolving versatility of payloads. However, the

versatility of the hardware is only one part of the solution: the operators need to be equally versatile in order to perform swing-role missions. Of course, there is no reason why UAV operators could not be as multi-skilled as the crews that operate manned platforms—provided they have the necessary situational awareness they need to do their job. And there lies the rub—because the way in which the operators are currently provided with the information necessary to have adequate situational awareness consumes vast quantities of another precious and limited resource—bandwidth!

Global Hawk

Given the way raw sensor data is currently dumped indiscriminately onto the UAV down link, the bandwidth available to the ADF will not be able to support significant numbers of UAVs operating simultaneously—let alone a whole fleet of them. Additionally the quantum of data is such that it requires a large number of operators to sift through and analyse.

In the future there is likely to be technical solutions to alleviate the bandwidth problem in the form of novel communication links such as laser communications and data compression techniques. However, the real solution lies in on-board processing of the data so that only relevant, easily interpreted information is passed back to the human operators. This is the only way to minimise the requirement for both bandwidth and people.

Unfortunately, effective on-board processing is not as easy to accomplish as it might first appear. It will require machine intelligence to make decisions about what the data means and what is relevant within the context of the

battlespace. Indirectly, these decisions will affect life or death judgements concerning targeting and engagement and the final outcome of the conflict. Not only will this require that artificial intelligence be developed to a stage where it can be trusted with such decisions, but there will also be the need to overcome cultural and social issues about handing so much power over to a machine. It will therefore take time— perhaps lots of it—for software to match the versatility and decision making capabilities of the human crew's 'wetware'.

In the meantime, small air forces such as the RAAF will have to bide their time, and limit their exploitation of UAV technology to niche roles where their use can still be justified despite their inefficiencies. This is not to say that the RAAF will not consider acquiring UAVs or even armed versions to meet particular operational needs, noting the combat success of the armed Predator for example. However, this would be done with the clear understanding that they would not yet have the inherent flexibility of a manned platform, but would fill a chosen niche capability. An example of a UAV meeting the Air Force's operational needs in a niche is the Multi-mission Unmanned Aerial System (MUAS) being considered under Air 7000.

To paraphrase Mark Twain, the news of the manned aircraft's death has been greatly exaggerated. Small air forces will continue to need them for some more years yet.

- *The current UAVs are generally optimised for single roles and therefore lack the inherent flexibility of manned platforms.*
- *Small air forces are reliant on flexibility for operational effectiveness*
- *UAVs can fill chosen niche capabilities to meet operational needs*

We should base our security upon military formations which make maximum use of science and technology in order to minimise numbers of men.

Dwight D. Eisenhower