By Nick Paterson

Unmanned Aerial Vehicles (UAVs) are not the latest or greatest scientific development to explode onto the technological battlefield in modern times. On the contrary, UAVs have been around for some 50 years and flew missions during both the Korean and the Vietnam Wars. They have also routinely been used to provide electronic intelligence, communications intelligence, and bomb damage assessment: cheaper and safer than manned aircraft.

However, although UAVs have been around for half a century, it has only been recently that UAVs have made headlines, eye catching for both the upper echelons of the military establishment and the public sector. What weight is there behind the proposal that UAVs will challenge the efficiencies gained from manned aircraft in future military operations? And, with particular focus on UK defence, could they be an alternative to the JSF (Joint Strike Fighter) which will be the last major fast jet procurement for some time? Spiralling costs in the JSF/carrier program has cast doubt as to how many will finally be deployed, and one suggestion has been the downscaling of the second proposed carrier in favour of a short-base platform viable for unmanned drones.

There are a number of arguments in favour for extending UAV usage, including; the increasing demand for immediate intelligence on the battlefield; limited numbers of manned aircraft assets; decreasing defence budgets; increasing operations tempos; and the high cost of and low tolerance for aerial casualties. More specifically, there must be a discussion into the issue of UAV development, and the potential for UAVs to replace other roles and missions currently dominated by manned aircraft, due to the overall cost effectiveness.

Currently, the UAV program is divided into two major areas: the Joint Tactical UAV Program and the Endurance Program. These two programs provide tactical and theatre commanders with direct, continuous, all-weather intelligence of the battlefield. 2 major advances have been made recently. Firstly, the Endurance program has increased the available flight time to 83 hours for each drone. Secondly, the US should unveil both a refuelling process in 2010 ensuring unlimited flight time and a drone of different design capable of 5 years continuous stratospheric flight, possibly using solar electric fuel. This also links in with the recent test flight of the Solar Impulse. This will allow IED (Improvised Explosive Device) planters to be spotted in play-back and neutralised more often than is already happening.

Since 1972 the UK UAV development and deployment has changed remarkably. The Canadair Midge 501 Drone system was the first to be fully utilised. The Drone system gathered data by flight over pre-planned flight paths using 'wet film' EO and IR sensors, resulting in data always being several hours old. This was replaced by the Phoenix series, which provided live video, with near real time target acquisition data, and the ability to dynamically re-task in flight. Phoenix was decommissioned in March 2008 to make way for the Watchkeeper Series, which will start service in 2010. In the interim period, the Lydian Hermes

450 System will be used and is currently operating in both Iraq and Afghanistan. These UAVs provide reconnaissance and intelligence to ground troops, artillery divisions and HQ.

Prevalence in UAV development is currently focussed on intelligence gathering, however, there are numerous other roles being developed and deployed. Among these roles are: psychological operations, laser designation and range finding, communications, NBC, and a strike capability. However, it must be noted, that despite ever advancing technologies, the targeting systems and air-ground strike capabilities of UAVs have their problems. Humanitarian sources have noted since 2006, drone-launched missiles have killed between 750 and 1,000 people in Pakistan. Of these, about 20 people were leaders of Al Qaeda, Taliban, and associated groups. Overall, about 66 to 68 percent of the people killed were militants, and between 31 and 33 percent were civilians, according to the report. Others describe the targeting and killing of civilians misinterpreted as hostiles by operational controllers. Future military operations will also be characterized by "Peace Support Operations" which encompass peacekeeping, peacemaking, peace enforcement and peace building. As such these will demand minimising costs, both in financial and human terms

In terms of payload carrying UAVs there has been much evolution. Reaper, a remotely flown drone has both air-to-ground missile capabilities and laser-guided bombs. It also acts as an all-weather Intelligence, Surveillance, Target Acquisition and Reconnaissance drone. This is followed by the Mantis, providing much the same whilst being highly autonomous and having a higher endurance (up to 24 hours). It also boasts high quality multi-sensor capabilities. Future advancement will see the deployment of Taranis, amalgamating the benefits of the Reaper and Mantis, but having a low signature (stealth technology), and better performance, command and control, lower maintenance and further communications upgrades.

An area currently being widely debated is the advance in Artificial Intelligence (AI) and its role in future UAV missions. Many worry about the proposals and the advances in AI programs that allow UAVs to track, target and destroy vehicles and other targets autonomously. Friendly fire incidents and civilian casualties are among the biggest concerns. Despite recent reports on this situation clearly stating that a human 'sign-off' protocol would still be in place in order to destroy any target it continues to worry many on the grounds of error or malfunction.

Some argue that UAVs will not result in the complete phasing out of the manned fighter jet and professional pilot, and cast a suspicious eye east at countries such China, Russia and less so, North Korea for their basis. Whilst the cost of UAV equipment makes them beneficial and favourable, this does not take into account the research and development costs. These, coupled with the level in advanced technologies required to produce and utilise UAVs obviously make them unavailable to some countries. This, it is argued, will ensure that development in fighter jets and pilots will continue, and therefore, surpass those of the west who drop manned fighter vehicles for warfare. Does the west really want to see such countries leading the way in manned fighter development and training?

The current meteoric rise of UAV development highlights the growing importance of UAVs in the future, and leads to the upshot question of whether UAVs will replace manned aircraft's roles and missions. With dwindling defence budgets, UAVs will be cheaper to field than

conventional manned aircraft. With this in mind, UAVs will be able to relieve some of the pressures on the high-demand, manned aircraft community.

Will UAVs see the end of the fighter pilot/jet in the UK? Probably not, for some time at least. UAVs may play a significant part in the answer since they have proven their combat mettle, but there are still too many roles they cannot fully complete. However, it should also be noted that the RAF is trialling the use of non-pilots - four "air minded individuals" - as operators of Predator UAVs. "Do [UAV pilots] need to have gone through the same level of scrutiny and seat-of-the-pants training as might be required for your JSF or Typhoon pilot? We just don't know, and that's the whole purpose of this trial," Wing Commander Jules Ball Officer Commanding 39 Squadron RAF told Jane's Defence Weekly recently.

UAVs are no doubt better equipped for intelligence gathering, and dangerous strike missions behind enemy lines, or black ops, but still fall behind when it come to air-to-air combat. It is also very unlikely, unless advances are made in aerial combat UAVs that other countries would be allowed to take the lead in manned aerial operations. The political backdrop to the issue in the west will ensure this. At present, the best is a combination of the two, retaining a small, highly developed, marine deployable, group of elite pilots and fighter jets to complement a larger UAV force. Logistical operations could then be transferred to the Army Air Corps. As such, one could envisage the disbanding of the RAF to achieve this. UAVs will continue to replace manned aircraft in many areas, but only time and technology will tell how much, and it will not be complete.