Many nations are involved in ongoing operations against terrorists, especially in the Middle East where the operating environment is complex. The intelligence, surveillance and reconnaissance (ISR) role carried out by Uninhabited Aerial Vehicles (UAVs) has become critical to the success of all military operations and is of great importance in the fight against diffused adversaries that are typical in both counter-terrorism (CT) and the counter-insurgency (COIN) operations. Conventional military forces have capitalised on the UAVs’ ubiquitous nature and the increasingly sophisticated information that they provide to plan and execute CT and COIN missions.

Although UAVs have reached a high level of technological sophistication, large investments are continuing to be made into the uninhabited aerial programs, collectively termed Uninhabited Aerial Systems. A majority of modern air forces today have an uninhabited element resident within them, the differences being only in the size of the force and whether or not they are armed. While UAVs have been on the inventory of air forces for some time, some have also kept pace with force structure changes, creating force elements that can operate independently or in conjunction with manned force elements on an as required basis. Currently most concepts of operations are oriented towards UAVs functioning in support of manned platforms. However, concepts that question this ‘normality’, where the support comes from manned platforms, and UAVs are the supported element, are already being discussed. This technology is already reflected in extant capability.

There are two points that must be clarified: one, complex missions that require a high level of assurance of success and security will continue to be conducted by manned platforms, and two, UAVs will never completely replace manned fighters, which continue to provide an unmatched multi-role function. This is accepted wisdom within the war-fighting, strategic and technological communities.

In the contemporary operating environment, UAV missions are centred on ISR and, in the case of armed UAVs, time-sensitive strike. In a benign air environment, UAVs provide significant advantages over manned platforms carrying out the same mission—they have greater endurance, have relatively lower operating costs, and, when flown at height can be unobtrusive, both in terms of low radar signature and visual detection. Perhaps the greatest advantage is that the more advanced UAVs have great versatility because they can be upgraded with a range of mission-specific systems making them tailored to fit a single purpose mission if required. In the ISR role, advanced UAVs now have the capability to identify and track a single individual for long periods of time. This facilitates the unerring neutralisation of high-value leadership targets when necessary.

It is a sign of the maturity of UAV operations that the capability is now clearly divided into the armed and unarmed versions and the concepts of operations have also diverged accordingly. Even unarmed UAVs have evolved in the mission-set range and are now routinely used in the information, surveillance, target acquisition,
and reconnaissance (ISTAR) role, which could be considered an enhanced version of the ISR role. Further, small-sized UAVs have been developed and deployed to detect and track an adversary’s mobile weapon systems, a capability that is advantageous in countering diffused adversaries functioning amongst the population in urban areas. These compact UAVs are irreplaceable when it comes to providing land forces with the ability to ‘look over the hill’. The Israeli Defence Force (IDF) is reported to have used such UAVs extensively during ‘Operation Protective Edge’ in the Gaza in 2014.

What is the likely direction of future developments in UAV technology? Possible future developments can be analysed in two independent streams—platforms and payload.

The emphasis on platform development will be to meet the demand for bigger platforms. Air forces want UAVs to be able to have greater range and endurance as well as to carry larger payloads in order to accommodate more capable sensors. It is likely that over the next decade, relatively larger UAVs will be fielded by a number of air forces. The other side of the equation, and one being pursued with equal intensity, is the attempt at reducing the size of UAVs. These would be difficult to detect or capture, but would have extremely limited capabilities since they would only carry a minimum payload.

UAV airframes have not changed substantially in the past few years, although more robust and larger platforms can be expected to be operational within the next decade. The optimisation and miniaturisation of payloads is a key area of research and development in UAV technology. The main challenge for military forces today is finding targets in a short time span, which is all that is available to a deployed force. Further, contemporary targets are less detectable and often widely dispersed. The need to detect them has led to the development of cameras with very high resolution and sensors able to gather wider information. Improved concepts of operations such as fusing data collected by different sources, almost in real-time by live transmissions to a larger platform with greater processing, exploitation and dissemination capabilities are also being trialled. The maturing of this concept could see the integration of airborne early warning (AEW) and signals intelligence capabilities, maybe even on board a UAV.

Electronic Warfare (EW) is another major role in which UAVs are being increasingly employed and the size and weight of the EW payload necessary to provide the required capability is one of the major factors pushing the increasing size of the platforms. Exploratory research is also being conducted in the development of a universal multi-sensor and multi-mission payload that could be carried in both high-altitude long-endurance (HALE) and medium-altitude long-endurance (MALE) UAVs, in addition to manned platforms as well as aerostats. The advantages in terms of cost-effectiveness and flexibility of such a payload would be enormous. This universal payload will provide high-definition infra-red imagers, TV cameras, low-light camera, narrow-field-of-view shortwave infra-red camera, laser range finder and designator.

This Pathfinder has only provided an overview of the advances being made in unarmed UAVs and their payloads. Similar improvements are being actively considered in the armed versions of UAVs.

The importance of UAVs in the contemporary battlefield cannot be overemphasised. However, the greater demands being placed on UAVs will increase the complexity of the system with a commensurate cost escalation as a penalty. Further, air power practitioners must also be cognisant of their vulnerabilities if they are to operate in contested air space. Essentially, in CT and COIN campaigns where significant air opposition is highly unlikely, UAVs perform critical roles in an effective manner. They are not a panacea for the dangers that face the military forces in the efficient application of force.

**Key Points**

- UAVs provide critical ISR capabilities to military forces engaged in CT and COIN operations.
- Technological developments are likely to enhance the capabilities of the UAVs through the provision of improved and flexible payloads.
- The utility of UAVs in contested air spaces will be limited because of their survival limitations in such an environment.