In December 2012, the RAAF announced that the new fleet of F/A-18F Super Hornet aircraft had achieved final operational capability. This announcement marked an important milestone of the introduction into service of a significantly improved version of the F/A-18A and B model Hornets first ordered by Australia in 1981. The Super Hornet differs to the classic Hornet in many aspects, not the least of which are a larger and redesigned airframe, improved avionics and radar systems, as well as significantly more powerful engines. While acquiring such an evolutionary platform is an exciting time for the RAAF, it is not the first time that it has operated an evolved design of an aircraft already in service.

In fact, from its inception, the RAAF has looked to newer versions of existing aircraft types to improve capability. The reasons have been varied—advances in technology, strategic imperatives, logistics challenges and industry developments have all influenced the choices of aircraft acquisition. An examination of just a few of the aircraft operated by the RAAF illustrates the influence of these factors on aircraft acquisition and capability development over the years.

The first occasion in which the RAAF operated an evolved aircraft design was when the DH9A was introduced into Australian service. This two seat, light, single engine bomber was a development of the highly successful DH4 bomber of World War I. The acquisition of the DH9A was the result of a 1919 UK offer to the Imperial Dominions of sufficient numbers of aircraft with which to establish an air force. From the Australian and British perspective this offer had the advantage of strengthening the global Imperial Defence structure, in essence a coalition of nations of which Australia was a part, while also providing the British with a useful means of disposing aircraft surplus to their requirements.

For Australia, the offer was a means to develop military aviation without the financial burden of having to buy aircraft. Designated with the serial ‘A1’, the DH9A became the first aircraft on the RAAF’s books when it formed in March 1921. In a twist of fate, the aircraft from which the DH9A evolved, the smaller, underpowered DH9 was also introduced into RAAF service at the same time with the serial designation of ‘A6’. While the fundamental design of the DH9 was sound, its inferiority to its descendent in terms of engine performance and overall reliability was marked, clearly illustrating the impact of technology on evolving aircraft design.

Technology improvements are not the only rationale for evolving existing platforms. During the 1930s as the probability of war became more likely, Australia became concerned that in any major conflict the supply of aircraft from the UK or the USA would become
the Orion platform has remained largely unchanged. Although Australia’s aircraft industry was embryonic at that time, the need to develop an indigenous aircraft design and manufacturing capability became a strategic imperative. Elements of Australian industry responded quickly to this need. In a partnership that began between a mining, metals and an automotive company, the Commonwealth Aircraft Company (CAC) was formed with blessing of the Australian Government, with the mandate to design and build aircraft for the RAAF. It quickly became apparent that Australia simply did not have the wherewithal to design and build high performance military aircraft from scratch. So it was decided that the first project for CAC would be the licensed production of a general purpose aircraft based on an existing design. The North American NA-16 two seat trainer was chosen as the basis for what would become the CAC Wirraway general purpose aircraft. Design changes included the inclusion of two .303 Browning machine guns mounted in the nose section and an additional gun on a flex-mount in the rear cockpit. Further changes were made to expand on the standard radio installation and to enable a camera to be installed. Later improvements included the strengthening of the aircraft structure to include a bombing capability and fitting dive-bombing flap to the wings. From 1942 the Wirraway served in operational theatres from Malaysia through to the South Pacific, and also served in Australia as a trainer, finally being retired from RAAF service in 1959. What was initiated as a measure to address a strategic challenge in Australia’s security became the foundation of an aircraft industry in Australia that went on to produce aircraft such as the Boomerang fighter, itself a derivative of the Wirraway, the Mustang, Sabre, Mirage and Jindivik UAV.

The extended life of the RAAF’s AP-3C Orion fleet, and its vastly enhanced anti-submarine warfare (ASW) and intelligence, surveillance and reconnaissance (ISR) capability illustrates a pragmatic financial and risk mitigation rationale to platform evolution. The Orion started life as the already highly successful Lockheed Electra—a civilian transport aircraft with sufficient adaptability inherent in its design to allow modification to a maritime surveillance aircraft for the US Navy. Changes included the installation of air-to-surface radar, magnetic anomaly detection equipment, wing hard points and a bomb bay. Since incorporation of the structural modifications for these improvements in the late 1950s, the fundamental airframe configuration of the Orion platform has remained largely unchanged. First introduced into RAAF service in 1968, the Orion’s sound design and enduring qualities has enabled a constant evolutionary development focused on improving the onboard ASW and ISR systems as well as weapons carriage. This has been a significant advantage, since the inherent risks and financial overheads associated with developing an all new platform are thereby mitigated. Additionally, the training overhead on aircrew and maintenance personnel has been reduced, as well as having a lesser impact on logistics and support services. The success of the RAAF’s AP-3C aircraft operating in recent counterinsurgency operations in both the maritime and overland environments has demonstrated the cost benefit of the investment in a systems approach rather than one based exclusively on platforms.

There are however, limits to the enhancement of capability of an existing platform or design. For example, the F-111 progressively evolved in capability and configuration over its entire service life. Its engines, avionics and weapons systems where subject to multiple improvement programs. However, evolving threats in its operating environment and increasing cost of operations resulted in its eventual retirement in 2010. Opportunities to operate evolved designs may also be impacted by the advanced technologies and materials that will change the way platforms are designed, built and kept viable within the battlespace. Global support services being developed around common joint capabilities will result in complex capability development decisions the RAAF is yet to experience. It remains to be seen if the evolution of platform designs to improve capability over protracted periods of time will continue to remain a feature of air power development.

Key Points

- The decision to develop capability through evolved weapons systems or by the procurement of all new weapons systems is influenced by advances in technology as well as strategic and economic considerations.
- A strong domestic science and technology capability as well as a viable aviation industry is essential to sustaining air power in Australia.
- Knowing when to stop platform and weapon system evolution in order to pursue a step change in capability is a mark of professional mastery.