Air Power in the Quadrennial Defence Review

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Despite much of the media commentary, air power was anything but a major loser in the final Quadrennial Defence Review report. While many of the outcomes in the QDR did not meet the expectations of more ambitious advocates of air power, it is clear that air power plays a major role in all four prongs of the QDR grand strategy.

The challenge over the coming decade, which the US Air Force will face, lies in reconciling tight budgets with the capability expectations arising from the QDR strategy. Some critics have labelled the QDR as "the problem posing as the solution".

Importantly, the QDR is the first major US document that comprehensively elevates strike and Intelligence Surveillance Reconnaissance across almost all domains of national grand strategy (http://www.qr.hq.af.mil/pdf/2006QDRReport.pdf). This is an important transition point in the US strategic position.

The vision for the QDR is eloquently presented thus: "Joint air capabilities must be reoriented to favor, where appropriate, systems that have far greater range and persistence; larger and more flexible payloads for surveillance or strike; and the ability to penetrate and sustain operations in denied areas. The future force will place a premium on capabilities that are responsive and survivable. It will be able to destroy moving targets in all weather conditions, exploit non-traditional intelligence and conduct next-generation electronic warfare. Joint air forces will be capable of rapidly and simultaneously locating and attacking thousands of fixed and mobile targets at global ranges. The future force will exploit stealth and advanced electronic warfare capabilities when and where they are needed. Maritime aviation will include unmanned aircraft for both surveillance and strike. Joint air capabilities will achieve a greater level of air-ground integration."

This vision is not for the faint of heart, in capability or budgetary terms. The demand for increased range, persistence and payloads is in practical terms a death knell for lightweight combat aircraft, be they manned or unmanned. It is a fundamental departure from the Cold War era model of matching large numbers of Soviet lightweight fighters with large numbers of US lightweight fighters, diametrically opposing the Cold War model.

QDR winners - (Clockwise from above)
F-22A, J-UCAS,
C-5 Galaxy, Global Hawk, Predator,
A-10, E-3C AWACS, E-8 JSTARS.

The demand for capabilities to "penetrate and sustain operations in denied areas" is no less challenging, as this prioritises high stealth capability assets like the F-22 and B-2A over legacy and less stealthy new designs.

The demand for capabilities for "rapidly and simultaneously locating and attacking thousands of fixed and mobile targets at global ranges" is one that again prioritises "heavy iron" over lightweight combat aircraft.

In the new world envisaged by the QDR, air power would be dominated by large, high capability assets, with range, payload and persistence being pre-eminent measures of worth.

This shift in the basic paradigm is not arbitrary; this arises from the basic strategic realities the US faces today and will face in the future. Opponents of the US and its allies, and potential opponents, fall into two broad categories.

The first are "non-state actors", insurgents, revolutionary warfare movements such as Al Qaeda, militias and paramilitary groups, and military forces of failed states or failing states, which are often geographically located in remote or under-developed regions or areas. Such players have no capability to contest air space, but are usually dispersed, highly mobile, well hidden and present as transient targets that must be engaged rapidly while the opportunity exists to do so.

As a result, combat aircraft must deploy to stations often a long distance from safe basing, orbit for many hours seeking contacts, and prosecute those contacts quickly and effectively once detected. This is the paradigm of the air war in Afghanistan, Iraq and will be representative of any "low intensity conflict" environment. The star performers in both of these "case study" campaigns were the B-52H and B-1B, as both could carry "swiss army knife" mixes of weapons, and could orbit for many hours on station, thousands of miles from their runways.

The second category of potential opponent are "nation-state actors", be they nations acting as havens for terrorists, nascent regional powers, or rogue states pursuing Weapons of Mass Destruction. Such players may be geographically located at significant distances from US basing, or may have the capability to threaten or deny US basing in closer proximity. More than often they will have advanced "anti-access capabilities" such as Russian SA-10/SA-20/SA-12 SAM systems, Sukhoi Su-27/30/35 Flankers supported by AEW&C, or other capabilities designed to hinder penetration of airspace. Such opponents are effectively 'analogues' to the classical Warsaw Pact insofar as they have advanced capabilities, possibly in large numbers, and an intent and capability to contest airspace.

This 'flipside' of the strategic environment underscores the deep dichotomy the US faces today in planning its force structure. Opponents may well be 'low tech' players, or 'hi tech' players, and optimising the force structure for either category leaves the US vulnerable to the alternate category of players.

The types of air capabilities that are most effective against the second category of opponent are stealthy strike and ISR platforms, especially strike platforms with the capability to deliver large payloads of autonomous smart munitions, designed to rapidly disrupt and attrit ground forces, naval forces and air force basing and infrastructure. The B-2A and the F-22 are the pivotal assets in the current US force mix for providing such effects.

The QDR has crystallised a deeper reality that has emerged since the Cold War: that the benefits of networking and the information revolution require larger and heavier assets to exploit intelligence effectively, rather than use the lightweight assets fashionable in the latter decades of the Cold War. The QDR outlines in detail specific measures to adapt the existing force structure.

It observes, "the Air Force has set a goal of increasing its long-range strike capabilities by 50 per cent and the penetrating component of long-range strike by a factor of five by 2025. Approximately 45 per cent of the future long-range strike force will be unmanned. The capacity for joint air forces to conduct global conventional strikes against time-sensitive targets will also be increased."

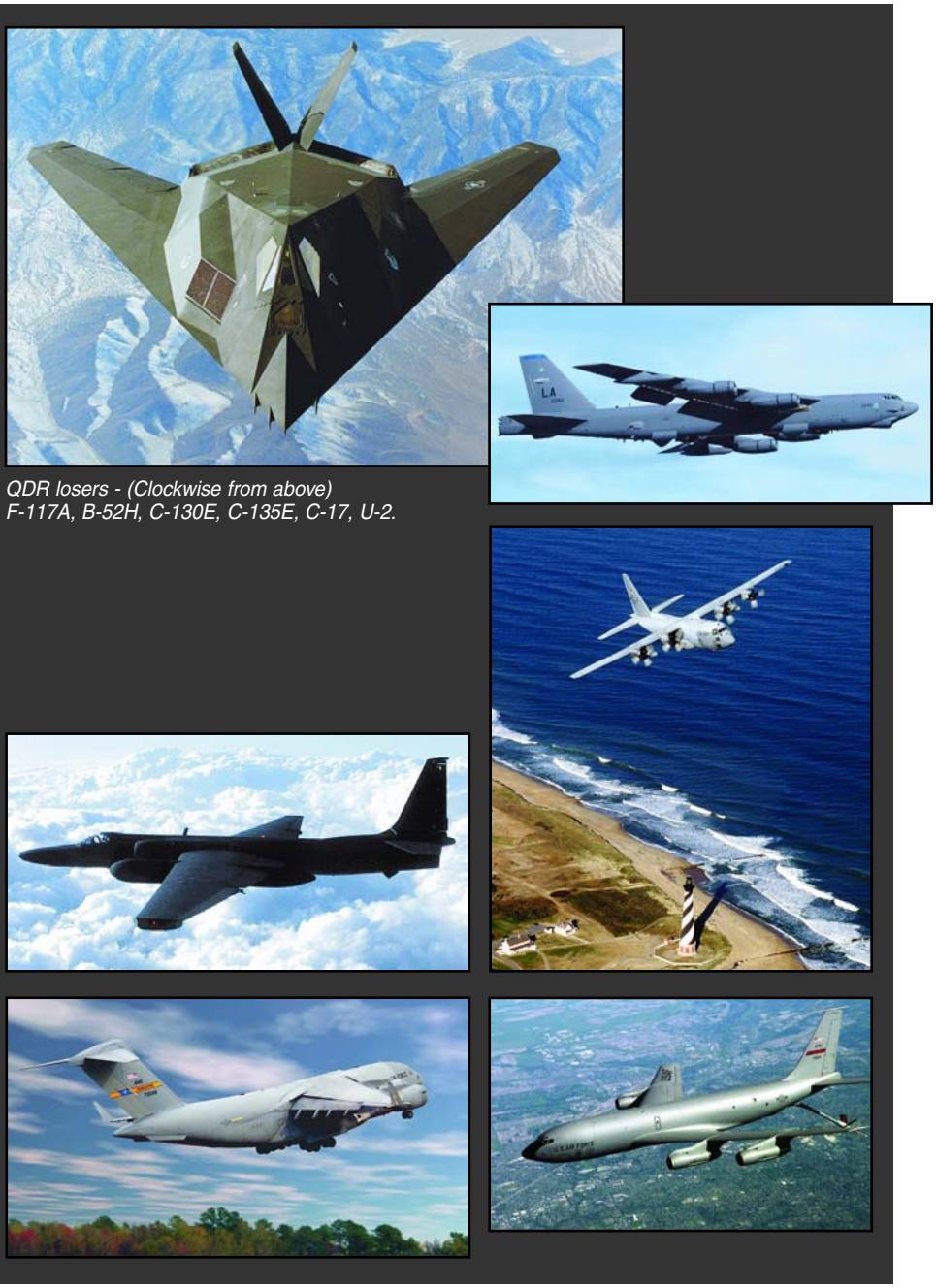
The first specific measure was the biggest single surprise in the QDR, and one that will have far reaching implications in force structure and budgetary terms. This measure is to be a new bomber: "Develop a new land-based, penetrating long-range strike capability to be fielded by 2018 while modernizing the current bomber force."

Basic arithmetic indicates that around 80-100 "penetrating" long range strike aircraft will be required, pushing close to the originally intended numbers for the B-2A, of which 132 were originally sought. Retaining the existing B-1B rounds out the numbers for the planned 50 per cent growth in long-range strike capability.

The caveat that "45 per cent of the future long-range strike force will be unmanned" is interesting. On these numbers, this means that a force of 30-50 B-1B and 21 B-2A would be expanded with around 80-100 new-build bomber aircraft, of which up to 70 would be unmanned and around 10-30 manned.

This opens up several possibilities. The first is the manufacture of 10-30 improved B-2Cs, and the development and manufacture of at least 70 unmanned bombers in the payload class of the B-1B/B-2A, or larger numbers in a smaller payload class, but matching the range of existing bombers.

The second possibility is the development and manufacture of around 80-100 bombers of a new design, with options including a 10/90 to 30/70 split between manned and unmanned variants, or the more flexible option of all being built as manned with the capability to be flown unmanned if required. The latter approach is feasible, trading lower development costs for higher manufacturing costs.



QDR losers - (Clockwise from above)
F-117A, B-52H, C-130E, C-135E, C-17, U-2.

As the new bombers must be "penetrating" stealth is a prerequisite. What remains unstated is whether the new aircraft will also supercruise, as this provides both survivability and sortie rate advantages.

The aim of fielding the new design in 2018 is ambitious, as it allows only 12 years between conception and initial operating capability. This will put a premium on low risk design strategies and exploitation of existing technology, such as F119/F135 engines, APG-77/81 AESA technology, third generation stealth materials, and other spin-offs from the F-22 and JSF programs. A key issue is whether the artificial intelligence technology will be mature enough to permit the target of 45 per cent of the fleet being unmanned, without compromising the flexibility and survivability of the new bomber.

Funding will remain a big question for this new capability. The original budget for 132 B-2As was around US$80B during the 1990s. Unit costs for a new bomber in the size and weight class of the B-52H, B-1B and B-2A will be of the order of US$300M-500M, subject to numbers and cost descalation rates. Assuming US$20B for SDD and US$50M for manufacture, the resulting US$70B program cost estimate fits closely to the ATB/B-2A program of over a decade ago.

The new bomber will have to compete with J-UCAS and the recapitalisation of the fighter and tanker fleets. The latter is explicitly specified in the QDR as a measure for enhancing global mobility, but is not detailed further.

The second specific measure is the restructuring of the Joint Unmanned Combat Air System (J-UCAS) program, with the specific aim to "develop an unmanned longer-range carrier-based aircraft capable of being air-refueled to provide greater standoff capability, to expand payload and launch options, and to increase naval reach and persistence."

The third specific measure is the doubling of coverage provided by existing RQ-1 Predator and RQ-4 Global Hawk UAVs, by increasing numbers further.

The fourth specific measure is a restructuring of the F-22A program to extend production until 2010 "to ensure the Department does not have a gap in 5th generation stealth capabilities" that is, as a hedge against JSF collapse and to open up opportunities for additional aircraft in a future funding environment. In the wake of the QDR release the latter issue is already being canvassed.

The final specific measure addresses future fleet size: "Organize the Air Force around 86 combat wings (fighter, bomber, ISR/Battle Management/Command and Control, mobility, Air Operations Centers, Battlefield Airmen, other missions and Space/Missile) with emphasis on leveraging reach-back to minimize forward footprints and expedite force deployments, while reducing Air Force end strength by approximately 40,000 full-time equivalent personnel with balanced cuts across the Total Force."

Curiously absent in the QDR report was the Joint Strike Fighter, neither named nor referred to directly once in the 113-page document. Given the originally planned US$256B-plus program budget, its absence in the QDR document is remarkable to say the least. Media reports in Australia falsely claimed the QDR endorsed continuation of the JSF program in its current form. The QDR simply avoided the JSF issue completely.

The QDR report did not mention the Joint Strike Fighter program. Uncertainty about the future of the program will remain.

The central question arising from the QDR measures is: how the US will fund the ambitious expansion of strike capabilities, be they US Air Force capabilities or the new long range US Navy J-UCAS, which for all intents and purposes is filling the vacant niche left by the A-12A Avenger II cancelled 15 years ago. This expansion must compete with the F-22A, the JSF and tanker fleet recapitalisation.

The JSF will now be confronted with pressures on two fronts. In capability terms the JSF is not a good fit for the range/payload/persistence intensive environment, which is driving QDR strategy and force structure planning. Designed and sized around Cold War era strategic constraints, the JSF is put simply too small for the emerging strategic environment (refer http://www.ausairpower.net/APA-2005-04.html).

On the funding front, the JSF will have to directly compete in its own "strike capability" niche against the J-UCAS and the new strategic bomber fleet, and indirectly compete with new tankers for funding.

Since its inception, the JSF program has seen steady encroachment into its capability niche. The Block 20 and proposed Block 30 and 40 upgrades to the F-22 have seen JSF hardware directly transplanted into the F-22, entering production well before any JSFs come off the production line. A Block 30/40 configuration F-22 will outperform the JSF in almost all strike roles.

Further encroachment has arisen as US heavy bombers are increasingly used for close air support and "killbox interdiction", with investments in laser targeting pods for the B-52H, B-1B, and the intended retrofit of the JSF Electro-Optical Targeting System (EOTS) in the B-2A. The steady forward capability creep of the J-UCAS toward more persistence and payload has pushed it into the size and weight class of the JSF, and into a bracket of superior payload/radius performance. While the Marine Corps / UK STOVL JSF remains unchallenged in its core capability niche, the US Navy CV variant will compete for deck space and budgets with the F/A-18E/F and J-UCAS. The US Air Force CTOL variant will have to compete in budgets, roles and missions against the F-22A, the J-UCAS and the heavy bomber fleet. In high threat scenarios the JSF competes at a disadvantage, and in long range or highly persistent scenarios it also competes at a disadvantage.

In the wake of the QDR other cuts to US Air Force force structure were announced. The F-117A Nighthawk stealth fighter will be retired by the end of the decade, effectively being replaced by the F-22A. The C-130E Hercules and KC-135E Stratotanker will also vanish. The size of the B-52H fleet will be reduced to free up funds for further upgrades to the B-52H, B-1B and B-2A. The U-2 is also expected to retire as Global Hawk numbers grow. It is expected that C-17A production will cease after tail number 180, before the end of the decade.

Incremental improvements will arise from planned upgrades to the C-5 Galaxy, C-130J and A-10 Thunderbolt II, with the E-3C AWACS and E-8 JSTARS to be refurbished for life extension.

In conclusion, the QDR recommends sweeping changes over the next one and a half decades, with air power playing an increasing role in most key scenarios. In programmatic terms, the winners are the heavy bomber fleet, tanker fleet, C-5 Galaxy, F-22A Raptor, J-UCAS and ISR systems, especially UAVs. The losers are the C-17, U-2, F-117A, and other legacy assets, with the JSF's future remaining unclear.