

Joint Command and Control of Australian Airspace

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Introduction

Aviation is an industry of national strategic importance and a major contributor to Australia's economic prosperity.¹ The Australian Government considers Australia's airspace to be a national resource and the airspace management network to be a vital element of national infrastructure.² Accordingly, the Government has enacted airspace legislation and regulations, and allocated resources to ensure a safe and efficient airspace system, understandably focused on commercial aviation.

While the ADF is not strictly bound by civil aviation regulations, Defence is obliged—as a consequence of the concurrent civil and military use of airspace—to accord with civil regulations. However, if one extrapolates Australia's airspace as a national resource to Australia's national water or electricity resources—and considers Defence as a substantial owner, manager and user of that resource—it could be concluded that Defence's use of airspace is not being achieved with adequate focus on 'value-for-money'.

A key principle of Australia's airspace regulation is the 'flexible use of airspace', whereby civil and military airspace management agencies are expected to collaborate to achieve efficiencies through airspace harmonisation.³ To that end, the Government in early 2015 commissioned the procurement of a Civil-Military Air Traffic System (CMATS) to provide a common Defence and civilian air traffic management platform.⁴ According to a statement by the Minister for Defence at the time, the system will enable Defence air traffic controllers to 'manage the various mix of air traffic and create a seamless flow of national and international air traffic'.⁵

Concurrently, the ADF is transitioning to technologically-advanced air-centric weapon systems that will engender cross-Service information sharing, including data relating to battlespace awareness.⁶ Provided the associated airspace command and control structure supports joint force objectives, these capabilities will enable informed, real-time decision-making relating to the integration and deconfliction of tri-Service platforms and joint fires. However, the simultaneous introduction of CMATS and the next generation of weapon systems is arguably drawing Defence into an era of airspace usage for which the ADF may be ill-prepared to manage.

Defence currently administers airspace under single-Service arrangements without an overarching policy to holistically align Defence airspace management with national strategy and joint force principles. Defence's ability to comply with national airspace policies and support future joint capabilities is degraded by its disparate command and control architecture which, outside major joint exercise periods, is largely not structured to support cross-Service decision making or to accord with real-time flexible use of airspace.

This article contends that the airspace management requirements of national policy and technologically-advanced air-centric capabilities exceed the decision-making abilities of Defence's airspace command and control structure. Furthermore, the ADF's current single-Service command and control architecture is inadequate to contend with the myriad airspace considerations and accountabilities—including Commonwealth legislation and regulations, Defence capital investment, airworthiness, joint force construct and Government imperatives—associated with the flexible use of airspace.

The article argues that Defence should adopt a joint airspace command and control structure to complement CMATS by applying the principles of ADF Joint Airspace Control doctrine to facilitate real-time and near real-time decision-making, thereby achieving the Government's intent for harmonised airspace management and the integration of the ADF's next generation of joint weapon systems.

Commonwealth airspace strategy

Australia's aviation industry is described within the *National Aviation Policy White Paper* as a 'critical enabling industry for the broader [Australian] economy'.⁷ This statement is an acknowledgement of Australia's reliance on aviation for both business prosperity and social cohesion, with the sector generating six per cent of Australia's 2013 GDP through its transportation of over 144 million passengers via some 1.4 million flights.⁸ These figures follow yearly increases with aircraft movements rising by 37 per cent since 2002, at an average yearly growth of around 3 per cent.⁹

The Australian Government considers aviation productivity to be of national strategic importance and has enacted a regulatory framework that provides federal governance to its supporting infrastructure and policies.¹⁰ Included within this legislation are the foundations for the regulation and management of Australia's airspace, which is considered a key enabler of aviation, and identified within the *Australian Airspace Policy Statement* as a 'national resource'.¹¹ Deputy Prime Minister Warren Truss reinforced this airspace-aviation relationship when he said in September 2014 that 'in planning for the future of the aviation industry, nothing is more important than air traffic management'.¹²

As an air traffic service provider for both civil and military aircraft from 12 of Australia's 36 controlled aerodromes/air bases, Defence is a significant contributor to the nation's air traffic management system.¹³ Defence delivers air traffic services for around 230,000 civilian aircraft movements each year, while Defence's airspace usage with and without air traffic services must be safely integrated with adjacent civil airspace usage.¹⁴ Government policies and strategies relating to airspace and air traffic management are therefore as applicable to Defence as they are to civilian stakeholders.

The Government's air traffic management policies encapsulate the governance of all Australian airspace, including restricted areas administered by Defence, under a common *Airspace Act* and subordinate *Airspace Regulations*.¹⁵ While Defence requires prioritised and occasionally exclusive access to airspace to undertake training and operations, it must do so within the legislative framework established by the Commonwealth.¹⁶

The Minister for Defence has delegations under the *Defence (Special Undertakings) Act 1952* to declare prohibited or restricted areas, including airspace above those areas.¹⁷ However, as the *Airspace Act 2007* accounts for all Australian airspace and includes the matter of national security, Defence administered airspace is declared under the provisions of the *Airspace Regulations 2007* and *Australian Airspace Policy Statement*, which delegates responsibility for the design and regulation of Australian airspace to the Civil Aviation Safety Authority (CASA).¹⁸

In recognition of its unique airspace requirements, under the *Airspace Regulations 2007*, the ADF is a nominated air traffic services provider and is entrusted with the management of airspace, as delegated by CASA, for the conduct of Defence operations.¹⁹ As an air traffic services provider, Defence is beholden to the *Airspace Regulations 2007* for the administration of its airspace, and to the *Australian Airspace Policy Statement*, which ensures all Australian airspace (civil and military) is centrally regulated for the common purpose of supporting government objectives.²⁰ Accordingly, all Defence airspace declarations are subject to civil regulation, and operations within such airspace must be considerate of the Government's national strategy for airspace management.

That strategy includes close cooperation between CASA, the civil air traffic services provider (Airservices Australia) and Defence to ensure the 'administration of Australia's airspace is both safe and efficient'.²¹ The culmination of this strategy is manifested in the *National Aviation Policy White Paper* and subordinate *Air Traffic Management Policy Directions* document released by the Government to describe Commonwealth policy for flexible use of airspace and civil-military harmonisation through commonalities in air traffic management systems.²²

In direct support of its airspace strategy, the Government commissioned a joint Defence-Airservices Australia project (known in Defence as Air 5431 Phase 3 [Air 5431], and in Airservices Australia as 'OneSky') to procure a single air traffic management system (CMATS) common to both providers. In reference to this project, Deputy Prime Minister Truss detailed government expectations for seamless compatibility between Airservices Australia and Defence by stating that he is 'looking forward to working

with ... the Minister for Defence ... in supporting our agencies' joint commitment to a harmonised national air traffic system'.²³

CMATS is targeted at supporting Australian legislation and policy by delivering efficient use of airspace and providing equitable access to airspace for all users.²⁴ However, the project's focus on air traffic services and air traffic management systems means that Defence's Air 5431 will only affect those airspaces immediately surrounding its air bases and will not, therefore, deliver the expected efficiencies to the majority of Defence's airspace. Unlike Airservices Australia's operations, the majority of Defence's airspace is not tactically managed or controlled by an Air Traffic Service unit, and will not be subject to the air traffic management surveillance or administration delivered by CMATS.

However, by harmonising Air 5431 with OneSky, Defence has committed itself to the development of joint civil-military concepts in airspace organisation, and an enactment of the intent of the *National Aviation White Paper* and *Air Traffic Management Policy Directions* with regard to the flexible use of airspace.²⁵ In practice, under the *Airspace Regulations 2007* and *Australian Airspace Policy Statement*, Defence is already obliged to consider the use of its allocated airspace in the context of a 'national resource' and to facilitate civil operations wherever practicable.

With the Commonwealth committing in excess of \$500 million towards Defence's new Air Traffic Management system, the Government and civil aviation industry will rightly and increasingly demand a return on this investment in terms of efficient use of airspace.²⁶ Under Air 5431, Defence may achieve efficiencies within its Air Traffic Services-managed airspaces associated with its air bases; however, the ability to replicate similar flexibility within its range and exercise area airspaces, such as the Woomera Restricted Areas, Shoalwater Bay Training Area and Eastern Australia Exercise Area, will present challenges for the ADF.

Defence's range and exercise area airspaces are managed by tri-Service tactical warfighting units or civilian range staff, who are neither qualified nor equipped to issue tactical clearances or instructions to civilian aircraft, and therefore fall outside the realm of Air 5431/OneSky. Yet it is these airspaces that create the greatest disruption for the civil aviation industry, as the airspace volumes inevitably conflict with civilian air routes and are of such magnitude as to necessitate significant aircraft deviations with consequent economic and environmental implications.²⁷

As the Capability Manager for Defence Air Traffic Services, the Chief of Air Force signalled intent for Air 5431 to address civil deviations, and for Air Force airspace management to meet Government policy, when he stated in December 2011 that:

A single national Air Traffic Management system will remove the inherent limitations from separately managed pockets of airspace.... It will enable Airservices and Defence to dynamically manage airspace volumes and could ultimately enable less restrictive airspace construct to enhance both military and civilian operations.²⁸

However, under the current ADF airspace command and control construct, Army, Navy and Air Force range and exercise area airspaces operate under disparate management arrangements beyond the influence of Air Traffic Management systems—the ADF may, therefore, be at risk of over-promising in terms of linking Air 5431 to improvements in Defence's part of nation-wide airspace management.

Australian airspace regulations and policies reference Defence airspace as a single entity, implying management by a single organisation; hence the expectation of Government and the civil industry is that Air 5431-OneSky collaboration will apply to all ADF airspace and facilitate increased flexibility in nation-wide airspace use.

The informal cross-Service airspace management arrangements within Defence defy this premise such that Air Force's cooperation with Airservices Australia will not result in greater efficiencies within Army and Navy administered airspace, and will have minimal efficiencies within Air Force's non-Air Traffic Services managed airspace, such as those associated with Woomera or Williamstown's 'fighting' airspace. Although Defence will continue to use airspace for purposes that are unsafe for civil aviation, regardless of Air 5431 or OneSky, there is an increasing obligation to share with civil aviation the airspace that

Defence is *not* using, as well as to share the airspace that Defence *is* using whenever it is safe to do so. To do otherwise undervalues this national resource.

To rectify Defence's airspace command and control predicament and allow Air 5431 to facilitate the Government's expectations in increased flexible use of airspace, Defence needs to devise a method for uniting each of the Services' airspace management practices via an efficient system that supports a common civil-military harmonisation policy. Defence's Air 5431-OneSky collaboration would therefore benefit from an associated internal Defence process that correlates each Service's airspace management with a central governance and accountability model that defines a single Defence airspace management policy to meet the objectives of the *Australian Airspace Policy Statement* and *Air Traffic Management Policy Directions*.

Airspace airworthiness

As a function of the Defence Aviation Safety Program, the *Defence Operational Airworthiness Manual* promulgates a clear chain of command for the airworthiness regulations associated with its airspace control services, including air battle management, air traffic services, battlefield airspace control, ship aviation facilities and the management of air weapons range airspace.²⁹ Each control service is conducted under the authority of an Operational Airworthiness Authority, which is directly responsible to its relevant Service Chief and accountable to the Defence Aviation Authority (Chief of Air Force) for the safe conduct of those services.³⁰

To meet their accountabilities, the Operational Airworthiness Authorities are required to publish an operational document detailing airspace management procedures, inclusive of compliance with the *Airspace Regulations 2007* and government policy.³¹ As each Service possesses an Operational Airworthiness Authority with airspace-related responsibilities, Army, Navy and Air Force have each published an array of Service-specific documents that promulgate airspace management procedures.³²

While these documents are intended to meet the requirements of the *Defence Operational Airworthiness Manual*, they do so in isolation owing to the absence of an overarching Defence airspace management policy and corresponding hierarchy of documentation. Each Service therefore individually judges how to comply with Government policy as there are no ADF-wide standards against which to assess compliance with the airspace harmonisation requirements of the *Airspace Regulations 2007*, *Australian Airspace Policy Statement* and *Air Traffic Management Policy Directions*.

Defence's management of tactical airspace documentation and procedures occurs in isolation within the Services and without a formal means for cross-referencing such procedures with strategic intent.³³ The resulting effect is that each Service may interact with civil industry under varying objectives, priorities and processes, and military aircraft may operate under dissimilar procedures as they move between Defence airspaces.

Furthermore, as each Service's aircraft routinely operate within the other Services' airspaces, Operational Airworthiness Authorities hold vested interests in the airspace management procedures of the other Services and require the ability to dictate minimum airspace preconditions for particular aircraft types in all Defence airspaces.³⁴ The *Defence Operational Airworthiness Manual* supports this provision, as one of its objectives is to 'prescribe common minimum requirement' across Defence.³⁵

The development of a centralised ADF airspace management policy would address these airworthiness issues through the articulation of common ADF standards designed to form the basis of each Service's procedures, while facilitating unambiguous compliance with strategic intent. A strategic policy would also establish the metrics required to gauge the success of ADF airspace management and provide the foundation on which the Defence Aviation Authority and Operational Airworthiness Authorities may assess their accountabilities.³⁶

'Train as you fight' – joint airspace command and control

Warfighting skills of the modern ADF involve prolific tri-Service use of airspace to support munitions trajectories and aircraft, as well as the requirement to monitor airspace to detect and track an enemy's air

movements. Therefore, although each Service principally focuses their 'Raise, Train and Sustain' activities towards their primary domain, airspace has become the common physical environment that links the ADF's collective training. Australian airspace is therefore a joint domain, where the interaction of Defence's complex and dynamic air orientated activities requires meticulous coordination and planning to ensure safety and achieve effective outcomes.

As Defence airspace is managed in accordance with individual Service priorities and procedures, real-time decision-making affecting its tactical use has no formal means of occurring between Services. With disparate accountabilities peculiar to individual Services, operators within each of the Services have no requirement to appease their counterparts in facilitating the flexible employment of airspace without formal direction from within their respective Service's disciplinary chain-of-command.

Furthermore, with the added complexity of subjugation to civil requirements in accordance with legislation, current Defence airspace command and control also impacts the ADF's ability to meet its national obligations. Using the Eastern Australia Exercise Area airspace as an example, civil aviation industry queries regarding that airspace's use are directed to the Chief of Air Force, as the Defence Aviation Authority, yet the command of that airspace resides with Chief of Navy.³⁷ Under current arrangements, cross-Service tactical airspace decisions pass through strategic channels, when tactically focused decisions are required at the operational or tactical levels to support real-time or near real-time decision-making.

To capitalise on its dynamic characteristics and overcome procedural bureaucracies and Service cultural differences, joint airspace should ideally function under a mechanism that is responsive to variations in Defence tasking and integrates the Services' activities according to established priorities. This joint concept is reflective of Government direction which decrees that the ADF needs to be 'designed, developed and operated as an integrated, joint force across sea, land and air domains'.³⁸

The *2013 Defence White Paper* appointed the Vice Chief of Defence Force as the Joint Capability Authority to develop 'architecture designed to steadily improve the integration of single Service capabilities and systems'.³⁹ Accordingly, Vice Chief of Defence Force has promulgated the *Future Joint Operating Concept 2030* to aid capability development and 'inform doctrine, training and education to support the preparation of the Joint force'.⁴⁰ The *Future Joint Operating Concept 2030* subsequently identifies that collective training 'must be almost continuously joint if the ADF is to excel at joint war fighting' and 'involve the organisations with which the joint force will operate'.⁴¹

In lay terms, the *Future Joint Operating Concept 2030* requires that the ADF must train as it fights and, since it will fight as a joint force, it should train as a joint force using the command structures applicable to operations. Currently, ADF airspace command and control falls short of these aspirations.

The ADF's operational airspace command and control structure, known as the 'airspace control system', is described within *Australian Defence Doctrine Publication 3.3 (ADDP 3.3) – Joint Airspace Control*. The airspace control system comprises 'the people, procedures and equipment required to deliver airspace control', and is reliant on 'networked operations' and utilises a 'single Airspace Control Authority [to ensure] unity of effort through centralised planning and control'.⁴² The objective of this airspace control system is to de-conflict and synchronise airspace users, inclusive of civilian operators, while increasing operational effectiveness through the integration of varying platforms and weapons systems.⁴³

The ADF's operational airspace control system ensures Defence airspace is centrally administered under a common strategy with the necessary accountabilities and communications connectivity, is flexible in its application, and fosters civilian harmonisation to yield a domain supportive of joint and civilian operations. While this system was developed specifically to uphold the complexities and tempo of war-like operations, its foundations are reflective of the Government's intent for Australian airspace management, the principles of the *Future Joint Operating Concept 2030* and the Defence Aviation Safety Program's direction on accountability and commonality of processes. *ADDP 3.3* therefore appears to describe an appropriate policy for Defence airspace administration; however, through the deliberate nature of ADF doctrine, *ADDP 3.3* 'is not policy and does not have legal standing'.⁴⁴

Further, *ADDP 3.3* is 'joint doctrine for the guidance of ADF operations', which conforms to the Chief of Defence Force Directive that 'joint doctrine relates to the conduct of ADF military operations'.⁴⁵ The

authority of *ADDP 3.3* therefore does not translate to Raise-Train-Sustain activities within the single Services; the joint and civil harmonisation procedures contained within the document are reserved for operations and, in the absence of a corresponding 'peace-time' airspace management policy, the ADF relies on informal means for exercising cross-Service control of Australian airspace.

Combining the principles of *ADDP 3.3* with the Government's airspace and air traffic management policies, the *Future Joint Operating Concept 2030* and the Defence Aviation Safety Program would allow Defence to adapt a warfighting orientated command and control structure to the administration of its Australian airspace. This would facilitate its function as a joint capability and deliver efficiencies associated with decision making and harmonising its tactical employment across Defence.

Moreover, this would allow the ADF to operate within Australian airspace under a command and control structure identical to that utilised during operations and major joint exercises. ADF airspace would therefore function under an enduring, nation-wide process that supports Raise-Train-Sustain activities and operations, and would negate the need to establish temporary airspace command and control structures to suit individual tasks.

Linking the warfighters

Centralised command and control of airspace is associated with the wider issue of battlespace awareness. The airspace control system operates as a function of the ADF's networked force by linking airspace users to exchange situational awareness information for the purpose of platform integration and deconfliction.⁴⁶ As the ADF enhances its air-centric capabilities, the Services require a corresponding enhancement in their ability to join this network and obtain battlespace awareness.

The sensors inherent within capabilities such as the F-35A, Air Warfare Destroyer, E-7, EA-18G, the Counter Rocket Artillery and Mortar System and CMATS, delivered under Air 5431 and synergised through the Vigilaire command and control system, will all contribute to joint battlespace awareness. The technology they deliver and the battlespace within which these systems operate should be supported by a command structure that provides the ability to react to the information they share.⁴⁷ As this information includes data relating to the synchronisation and deconfliction of air assets and weapons systems, airspace management is a consideration within the command and control structure.

The technology-based network principles of *ADDP 3.3* complement the envisaged connectivity of the ADF's next generation of weapons systems. The associated joint command and control structure supports the flow of information between platforms and headquarters elements for the purpose of real-time, cross-Service decision making to achieve an effect based on joint force requirements.

A joint battlespace command and control network supportive of emerging technology is reflected in each of the Services' future operating concepts. The Navy, for example states that 'joint force integration' is required to separate friendly forces, while the Adaptive Army 'seeks to ensure that the generation and preparation of land forces is ... aligned with the ADF's joint command framework'.⁴⁸ The Air Force's vision for its recently-announced plan to integrate its new systems into a linked network, known as Plan Jericho, seeks to 'develop a future force that is agile and adaptive, fully immersed in the information age, and truly joint'.⁴⁹ Each of the Services therefore recognises the need to contribute to a joint command structure to support the capabilities of impending technologies.

Coincident with Defence's state-of-the-art acquisitions, growth in civil aviation has also fostered the development of advanced navigation systems to address the issue of airspace congestion.⁵⁰ As civil air traffic growth threatens to exceed airspace capacity, advanced navigation is creating non-standard 'user-preferred' routes and trajectories that maximise airspace use, achieve fuel and time efficiencies and are not considerate of ADF's static airspace boundaries.⁵¹

With economic benefits to be gained, coupled with the Government's policy on flexible use of airspace, Defence is likely to experience increased pressures for civil aviation access to military airspace congruent with these new civil navigation capabilities.⁵² The extant procedurally-based process of managing Defence's weapons ranges and vast exercise airspace is too archaic to react to contemporary civil flight management systems, which creates substantial friction between the civil aviation industry and Defence. Leveraging its requirements to flexibly support its own future platforms, a joint command structure may

provide Defence with the decision-making mechanism required to adapt military airspace management to global advancements in aviation technology.

The operational practices and supporting actions required to deliver a networked joint force will be challenging for Defence. It would be ambitious for the ADF to assume that it may operate each Service's future weapon platforms in isolation during peace-time, and expect to become immediately proficient in their functionality in a joint environment at the outset of operations. The technologies Defence has acquired are complex and require expert manipulation and integration to realise their potential. Additionally, contemporary joint operations are commonly conducted with a degree of integration with civil aviation either supporting the joint/combined force or as part of host nation's normalisation.

The ADF should therefore seek to replicate operational conditions during the conduct of its Raise-Train-Sustain activities to obtain proficiency in these new technologies and operational scenarios. To achieve this, appropriate command and control structures (including policy, systems and people) should be established to enhance linkages between the Services' capabilities and remove barriers across the Services and between Defence and civil aviation. The Chief of Air Force articulated this aspiration when stating that 'breaking down walls, breaking down stovepipes of Defence is central if we are actually going to realise the full capability of fifth gen[eration] capabilities'.⁵³

Conclusion

The Government's national strategy on air traffic management articulates a requirement for Defence and the civil aviation industry to apply the principle of flexible use of airspace. Project Air 5431 and OneSky are expected to meet this strategy; however, in the absence of a documented Defence airspace management policy, the informal airspace coordination arrangements between Services will not deliver efficiencies in Defence's significant use of this 'national resource' beyond those associated with air traffic services for ADF air bases. Air 5431 should therefore be accompanied by a Defence review of airspace command and control to unite the Services' airspace decision making and meet the Deputy Prime Minister Truss' expectation that OneSky 'will unify Australian skies'.⁵⁴

Concurrent with Air 5431/OneSky, the ADF is preparing for the introduction of multiple next generation systems, acquired to generate a joint force.⁵⁵ The sensor and networking capabilities of these platforms require a command and control structure designed to integrate the systems into the joint force and support cross-Service decision-making. The air-centric nature of these platforms and their abilities to contribute to battlespace awareness necessitates airspace management as a key consideration for their integration. ADDP 3.3 nominates a command and control structure suited to these requirements. Adapting ADDP 3.3's principles to the Raise-Train-Sustain environment will unite the Services' airspaces under a common command structure that develops expertise in joint operations, while enabling the decision-making necessary to comply with Government's strategy in national airspace administration and the defence of Australia.

Squadron Leader Hartley joined the RAAF as an Air Traffic Control Officer in 1994 and has held a range of tactical control and staff positions within 44 Wing. He controlled at Baghdad International Airport during Operation FALCONER/CATALYST and coordinated civil-military integration from the Combined Air and Space Operations Centre during Operation CATALYST/SLIPPER. Following his role as Chief Joint Airspace Control Cell in the Headquarters Joint Operations Command Air and Space Operations Centre, he attended the Australian Command and Staff College in 2014. Squadron Leader Hartley is currently posted as the Executive Officer to 453 Squadron.

Notes

- 1 Australian Government, *National Aviation Policy White Paper*, Department of Infrastructure and Transport: Canberra, 2009, p. 2. See also The Hon Warren Truss MP, Deputy Prime Minister and Minister for Infrastructure and Regional Development, 'Preparing for the Future: Address to Airservices Australia's Waypoint 2014 Conference', National Convention Centre, Canberra, 4 September 2014, available at <http://www.minister.infrastructure.gov.au/wt/speeches/2014/wts020_2014.aspx> accessed 14 May 2015.
- 2 Department of Infrastructure and Transport, *Australian Airspace Policy Statement 2012*, Australian Government: Canberra, 2012, p. 3, available at <<http://www.infrastructure.gov.au/aviation/aaps/index.aspx>> accessed 14 May 2015.
- 3 Flexible use of airspace is intended to enable the adaptable and flexible management of airspace, providing improved access to restricted airspace as a resource, increased air traffic management capacity to meet forecast growth in air traffic, support the transition to user preferred trajectory, and roam-free capability for ADF operations. It will ensure that restricted airspace segregations will be managed dynamically and restrictions on any particular volume of airspace will be minimised, thereby optimising user access to airspace resources and enhancing airspace capacity: see Australian Strategic Air Traffic Management Group, *Air Traffic Management: a strategic vision for Australia, Part B: Operational Evolution Document*, 2007, p 22, available at <http://astra.aero/strategicplan/docs/ATM_Strategic_Plan_2007_PartA.pdf> accessed 14 May 2015.
- 4 Acting Prime Minister and Minister for Infrastructure and Regional Development and Minister for Defence, 'Australia's OneSky: the most advanced, integrated air traffic control system in the world', joint media statement, 27 February 2015, available at <<http://www.minister.defence.gov.au/2015/02/27/acting-prime-minister-and-minister-for-defence-joint-media-statement-australias-onesky-the-most-advanced-integrated-air-traffic-control-system-in-the-world/>> accessed 1 March 2015.
- 5 Acting Prime Minister and Minister for Infrastructure and Regional Development and Minister for Defence, 'Australia's OneSky'.
- 6 Department of Defence, *Network-Centric Warfare Roadmap 2007*, Defence Publishing Service: Canberra, 2007, Chapter 8.
- 7 Australian Government, *National Aviation Policy White Paper*, p. 2.
- 8 Truss, 'Preparing for the Future'; and Department of Infrastructure and Regional Development, *2013 Airport Traffic Data*, available at <http://www.bitre.gov.au/publications/ongoing/airport_traffic_data.aspx> accessed 24 November 2014.
- 9 Department of Infrastructure and Regional Development, *2013 Airport Traffic Data*.
- 10 Australian Government, *National Aviation Policy White Paper*, p. 2.
- 11 Department of Infrastructure and Transport, *Australian Airspace Policy Statement 2012*.
- 12 Truss, 'Preparing for the Future'.
- 13 Defence provides air traffic services from RAAF Air Bases Amberley, Darwin, East Sale, Edinburgh, Tindal, Townsville, Pearce, Richmond and Williamstown, from Naval Air Station *HMAS Albatross*, and from Army Aviation Training Centre Oakey. Additionally, RAAF provides as-required air traffic services at RAAF bases Derby, Learmonth, Scherger and Woomera.
- 14 Details sourced from 44 Wing airfield statistics website (only available internally to Defence).
- 15 A Restricted Area is an airspace of defined dimensions, above the land or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions. Defence uses Restricted Areas to segregate hazardous military activities from other non-compatible airspace users (for example, for live firing or combat flying training). Definition obtained from the joint Airservices Australia and Department of Defence, *Manual of Air Traffic Services*, Version 31, effective from 4 March 2015, p. 49.
- 16 Department of Infrastructure and Regional Development, *Air Traffic Management Policy Directions*, Commonwealth of Australia: Canberra, 2012, p. 8.
- 17 *Defence (Special Undertakings) Act 1952*, Section 14.
- 18 Department of Infrastructure and Transport, *Australian Airspace Policy Statement 2012*, paragraphs 11-3; and *Airspace Regulation 2007*, Part 2, Regulations 5-7.

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- 19 *Airspace Regulation 2007*, Part 2, Regulation 13 (3).
- 20 The Civil Aviation Safety Authority (CASA) may delegate the ADF airspace management responsibility. In accepting such delegation, the ADF must manage the associated airspace under the same conditions and obligations as that exercised by CASA: see *Airspace Regulation 2007*, Part 2, Regulation 13 (2); and '[t]he administration of Australian-administered airspace shall be in the best interest of Australia: see Department of Infrastructure and Transport, *Australian Airspace Policy Statement*, paragraph 8.
- 21 Department of Infrastructure and Transport, *Australian Airspace Policy Statement 2012*, paragraph 43.
- 22 Harmonisation of civil and military aviation procurement, provision of services, and training has significant potential for safety, operational and financial benefits for civil and military aviation users: see Department of Infrastructure and Regional Development, *Air Traffic Management Policy Directions*, p. 8.
- 23 Warren Truss, Minister for Infrastructure and Regional Development, 'Safeskies 2013 – Theme: People and Technology', speech to Safeskies conference, Hotel Realm, Canberra, 16 October 2013.
- 24 The object of the *Airspace Act* is to ensure that Australian-administered airspace is administered and used safely, taking into account protection of the environment, efficient use of that airspace, equitable access to that airspace for all users of that airspace and national security: see *Airspace Act 2007*, Part 1, Section 3 (b) and (c).
- 25 Phase 2/3 of Air 5431 will replace the existing Australian Defence Air Traffic System with the Defence Air Traffic Management and Control System for integration and harmonisation with Airservices Australia's Air Traffic Control Future Systems project: see Department of Defence, *Defence Capability Plan 2012*, Public Version, Defence Publishing Service: Canberra, 2012, p. 44; and The Civil-Military Air Traffic Management Committee will support Airservices Australia's and Defence's efforts to improve efficiency and effectiveness, productivity and operations, and support implementation of the single national air traffic management system, OneSky Australia: see Airservices Australia, 'Military Collaboration' in *Airservices Annual Report to Parliament 2013-14*, Airservices Australia: Canberra, 2014, p. 44.
- 26 Acquisition cost for Air 5431 phase 2/3 is \$500m. Through-life support costs are to be determined: see Department of Defence, *Defence Capability Plan 2012*, 45; and OneSky's primary role is to plan, develop and implement a new air traffic management platform to meet future needs. It also represents an opportunity to realise a level of harmonisation with Defence: see Airservices Australia, 'Onesky Australia', available at <<http://www.airservicesaustralia.com/projects/onesky-australia/>> accessed 25 November 2014.
- 27 An associated area for greater civil/military cooperation in the future is the continuing development and adoption of the flexible use of airspace concept. Flexible airspace aims to maximise the use of available airspace volumes while providing the required segregation for non-compatible activities. Flexible use of airspace optimises civil access to military airspace and vice versa ... when the overall benefit of such flexibility to civil and military airspace outweigh the costs: see Australian Government, *National Aviation Policy White Paper*, pp. 123-4; and '[t]racking restrictions applied during military exercises (such as Pitch Black) affect commercial schedule and operations': see Civil Aviation Safety Authority, Office of Airspace Regulation, *Aeronautical Study of Darwin 2010*, version 1.0 July 2011, pp. 15-6; and 'Evans Head restricted areas impact on airspace efficiency': see Civil Aviation Safety Authority, Office of Airspace Regulation, *Aeronautical Study of Class E Airspace Between Port Macquarie and Ballina*, Version 3.0, 28 February 2012, p. 4; and 'Sydney Air Traffic Control was unable to secure diversion through the Eastern Australian Exercise Area Airspace, Sydney traffic was diverted up to 70NM and the airport's traffic capacity reduced': see Airservices Australia, 'Air Traffic Services Occurrence Report 0135540 – Request for partial release of Nowra Restricted Airspace', 11 March 2015.
- 28 Department of Defence and Airservices Australia, 'Brief to Industry on ATC Future Systems', media release, 20 December 2011, available at <<http://news.defence.gov.au/2011/12/20/defence-and-airservices-brief-industry-on-atc-future-system/>> accessed 30 November 2014.
- 29 Department of Defence, *Australian Air Publication 8000.010, Defence Operational Airworthiness Manual*, Department of Defence: Canberra, 2014, Section 9, Chapter 1.
- 30 Department of Defence, *Defence Instruction (General) OPS 02-2 – Defence Aviation Safety Program*, Department of Defence: Canberra, 2011, paragraph 22.
- 31 Department of Defence, *Australian Air Publication 8000.010*, Section 9, Chapter 1.
- 32 They include the *Manual of Air Traffic Services*, Tactical Procedures, *Defence Training Area Management Manual*, Australian Books of Reference, Australian Fleet Tactical Publications, Range Orders, *Defence Instruction (General) ADMIN 38-1 – Policy and Procedures for the use of the Woomera Prohibited Area and Woomera Test Facility*, Air Command Standing Instructions, air base-specific Standing Instructions and Orders, Aeronautical Information Publications and exercise-specific Airspace Control Plans.

- 33 For example, Air Force operates its aircraft within the Eastern Australia Exercise Area under the authority of the Air Force Operational Airworthiness Authority, while the airspace management procedures for that exercise area are devised by the Navy Operational Airworthiness Authority.
- 34 Aircraft separation standards are determined by the Operational Airworthiness Authority for each aircraft type: see Department of Defence, *Australian Air Publication 8000.010*, Section 9, Chapter 1.
- 35 Department of Defence, *Australian Air Publication 8000.010*, Section 3, Chapter 1, paragraph 12.
- 36 An important feature of the Defence Aviation Safety Program is the incorporation of the accountability principle, which holds that individuals and organisations are responsible for their actions and may be required to explain them to others. Commanders remain accountable for the actions of their staff: see Department of Defence, *Australian Air Publication 8000.010*, Section 1, Chapter 2, paragraph 1.
- 37 Eastern Australia Exercise Area (Restricted Areas R453A-P) Controlling Authority is Fleet HQ Potts Point: see Airservices Australia, *Designated Airspace handbook*, AirServices Australia: Canberra, 2014, Section 13, PRD 20-21.
- 38 Department of Defence, *Defence White Paper 2013*, Commonwealth of Australia: Canberra, 2013, p. 76.
- 39 Department of Defence, *Defence White Paper 2013*, p. 76.
- 40 Department of Defence, *Future Joint Operating Concept 2030*, Department of Defence: Canberra, 2011, p. 1.
- 41 Department of Defence, *Future Joint Operating Concept 2030*, p. 17.
- 42 Department of Defence, *ADDP 3.3 – Joint Airspace Control*, Edition 3, Defence Publishing Service: Canberra, 2012, p. 2-1.
- 43 Department of Defence, *ADDP 3.3– Joint Airspace Control*, p. 1-1.
- 44 Department of Defence, *ADDP 3.3 – Joint Airspace Control*, p. iii.
- 45 Department of Defence, *ADDP 3.3 – Joint Airspace Control*, iii; and CDF Directive 18/2013, reference ADC/OUT/2013/R15722455, dated 25 September 2013.
- 46 Department of Defence, *ADDP 3.3 – Joint Airspace Control*, pp. 1-5.
- 47 Current ADF command and control arrangements will need to respond to technology by altering structure and not just processes, as in the past: see Department of Defence, *ADDP 00.1 – Command and Control*, pp. 1-8.
- 48 Department of Defence, *Future Maritime Operating Concept - 2025: maritime force projection and control*, Royal Australian Navy: Canberra, undated, p. 11, available at <http://www.navy.gov.au/sites/default/files/documents/FMOC_2025_Unclassified.pdf> accessed 14 May 2015; Department of Defence, *Adaptive Planning: Army's Future Land Operating Concept*, Australian Army: Canberra, 2009, p. 43.
- 49 Royal Australian Air Force, 'Plan Jericho' booklet, available at <<http://www.airforce.gov.au/plan-jericho/?RAAF-CrI57877IHUU/bo9YoJ64qWYIO7G/14Q>> accessed 25 March 2015.
- 50 Relentless air traffic growth threatens to outstrip airspace capacity, and in particular, our capacity to deal with it safely. *Future Journeys 2013–2032*, the Airbus global market forecast, focuses on the predicted growth in the Asia-Pacific region, which the manufacturer says will account for 36 per cent of all new passenger aircraft deliveries, compared to 20 per cent for Europe and 19 per cent for North America: see Civil Aviation Safety Authority, 'Global aviation growth and safety' in *Flight Safety Australia*, 3 November 2014, available at <<http://www.flightsafetyaustralia.com/2014/11/global-aviation-growth-and-safety/>> accessed 1 April 2015.
- 51 Required navigation performance is a necessary enabler to transition from navigation along fixed routes to more efficient flex tracks and user preferred routes where effects of head wind can be minimised and benefits of tail wind maximised: see Civil Aviation Safety Authority, *Performance Based Navigation Implementation Plan: ICAO Resolution 36-23, Implementation of Performance Based Navigation and Approaches with Vertical Guidance*, Version 1, March 2010, p. 2, available at <<http://www.casa.gov.au/wcmswr/assets/main/media/pbn-plan.pdf>> accessed 1 April 2015; and 'Airspace is a universal resource and should not be designated as purely civil or military.... Flexible use airspace research and development has demonstrated its close link with user preferred routes and trajectories, and collaborative trajectory planning as well as the critical importance of a shared model of airspace planning intent by pilots, airline operations/navigation planning personnel, controllers and other traffic manager': The Australian Strategic Air Traffic Management Group, *Air Traffic Management: a strategic vision for Australia, Part A: Operational Evolution Document*, 2007, p. 23, available at <http://astra.aero/strategicplan/docs/ATM_Strategic_Plan_2007_PartA.pdf> accessed 1 April 2015.

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- 52 Harmonisation of civil and military aviation procurement, provision of services, and training has significant potential for safety, operational and financial benefits for civil and military aviation users: see Department of Infrastructure and Regional Development, *Air Traffic Management Policy Directions*, p. 8.
- 53 'RAAF's "Plan Jericho" to break down barriers to realizing F-35's full potential', in *Australian Aviation*, 30 May 2014, available at <<http://australianaviation.com.au/2014/05/raaf-plans-to-break-down-barriers-to-realising-f-35s-full-potential/>> accessed 18 March 2015.
- 54 Acting Prime Minister and Minister for Infrastructure and Regional Development and Minister for Defence, 'Australia's OneSky'.
- 55 Australia's maritime strategy requires an ADF designed, developed and operated as an integrated, joint force across sea, land and air domains: see Department of Defence, *Defence White Paper* 2013, p. 76.