Australian Government

Department of Infrastructure, Transport, Regional Development and Communications

National Emerging Aviation Technologies

POLICY STATEMENT

May 2021

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Cover photos

Top: A drone completing a thermal inspection of Moree Solar Farm, which will identify defects and ensure optimum performance of the solar panels. Image courtesy of Trendspek.

From left: 1. Koala populations have declined by as much as 80% in some areas. Drones are being used to find out how many there are and where they are located. The key is making conservation cost-effective. Image courtesy of DJI. 2. The world famous Little Ripper Lifesaver drone is fitted with specialist search and rescue capabilities including deployable rescue pods that inflate on impact. This particular model performed the world's first coastal rescue saving two young boys off the coast at Lennox Head in NSW in 2018. Image courtesy of the Ripper Corporation. 3. Invasive weed spraying utilising a Multirotor, Remotely Piloted Aircraft. Image courtesy of Suasrov. 4. SB4 Phoenix solar drone about to take-off for waterpoint monitoring. Image courtesy of Sunbirds. 5. Vertiia prototype aircraft photographed at event for announcement of partnership between AMSL Aero Pty Ltd, developer of Vertiia aircraft and Careflight, aeromedical provider Nov 2020. Image: Courtesy of Careflight.

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A drone completes a full bridge inspection after flood waters ravaged the area in remote Queensland. Images are processed into a 3D model to enable engineers to assess it remotely. Image courtesy of Trendspek.

Contents

MDH Cattle Station flying a SB4 Phoenix. Sunbirds' drones are used in cattle stations to autonomously check water points and remote assets. Image courtesy of Sunbirds.

Ministerial statement

Australia has long been at the forefront of innovation and pushing boundaries in the aviation sector. Groundbreaking Australian aviators, Nancy-Bird Walton and Charles Kingsford Smith were instrumental in opening up Australia and connecting us to the world. New aviation technologies are an opportunity to continue showcasing Australia's stewardship of the sky, and our ability to embrace new ways of living and working.

The tyranny of distance and our dispersed population poses a unique challenge for our transport and logistics sectors. Emerging aviation technologies, such as drones and Advanced Air Mobility (AAM) are providing real and viable options to solve this challenge.

Technology has developed at such a significant pace that we now find ourselves on the cusp of a digital revolution in aviation and aerospace. This new digital technology promises a range of significant economic and social benefits that can improve our way of life.

This Australian Government's National Emerging Aviation Technologies (NEAT) Policy Statement will position Australian businesses and industries to adopt and integrate emerging aviation technologies. Such technology will facilitate the safer, cheaper and more efficient movement of people and goods. It is already transforming a range of industries including agriculture, mining, construction and public safety.

Over the coming decades, drones will bring tangible mobility and healthcare benefits for regional and remote Australians. Drone technologies and AAM will improve accessibility and connectivity and enable smoother and safer pathology delivery services to regional and remote communities.

The NEAT Policy Statement will pave the way for the establishment of foundational market management approaches, digital service delivery systems and regulatory frameworks to create an operating environment that will enable and promote continued innovation, complexity of operations and growth in an appropriate manner. It provides a coordinated a consistent approach to managing the sector across Australia.

The introduction and evolution of drones and AAM will promote direct reductions in emissions through greater efficiencies and through the use of renewables. Small delivery drones have lower emissions than other delivery modes, in particular short car trips, and the delivery drones operating in Australia are already reducing congestion and pollution on our roads.

Over the coming years, drone technologies will unlock transformational benefits for mobility, work and population settlement in Australia. A coordinated national whole-of-government approach to managing this sector will decrease red tape for industry and enable the efficient commencement of operations in a manner that is safe, secure and considerate of the community and the environment.

Introduction

Above: The Little Ripper Lifesaver continues to advance with their Spotter Ai tech developed to identify sharks, other marine life and possible dangers, as well as ultra-low latency live-streaming capability through their Ripper Live software. Image courtesy of the Ripper Corporation.

The drones and newly emerging Advanced Air Mobility (AAM) sector will create new jobs, industries and markets, and can connect our cities and regions with comparatively less capital investment than competing transport modes. Many Australians will benefit from the introduction of new cost-effective and efficient methods for moving goods and people. The rapid adoption and development of new aviation technology can be used to drive efficiency and new business opportunities that will increase resilience in Australian businesses and the services they provide.

This technology is already delivering benefits to the Australian economy, and is projected to deliver a $14.5 billion benefit to Australia's Gross Domestic Product and create and sustain 5,500 jobs annually over the next 20 years.

It is also essential that the sector grows in manner that is safe, secure and considerate of the community and the environment.

This NEAT Policy Statement articulates the Australian Government's commitment to supporting the continued development of the sector and outlines the approach to managing and enabling this evolving market. It will strengthen Australia's leadership in innovation and adoption of emerging technology and enable industry to make informed decisions regarding investment, developing technology and commencing operations in Australia.

The NEAT Policy will enable the capability of businesses to adopt new and emerging digital aviation technology that will support Australia's ambition to become a leading digital economy by 2030. It will also support continued advancement and uptake of environmentally friendly electric propulsion systems, next-generation battery and fuel-cell technology.

The Australian Government will pursue a coordinated and cooperative whole-of-government system-wide approach to managing and enabling the sector. The initiatives and approaches outlined in this statement will lay the foundations for future government services and processes that can be scaled and adapted as the technology and the services it can provide evolves. The government will continue to work closely with industry on the development of these initiatives and approaches.

This Policy Statement outlines a considered and thorough approach for progressing a range of coordinated initiatives on rules and enforcement, infrastructure development, legislative change programs and utilisation of technology to support the development of novel service delivery approaches that will underpin the evolving operations. This will ensure Australian business and communities can readily adopt and integrate drone and AAM operations in an appropriate manner.

Initiatives and trials will be developed with a focus on operational readiness to support the commencement of viable commercial services. The Australian Government believes this approach will support the development of a strong and vibrant Australian-based emerging aviation technology sector, support the development of associated industries, and will strengthen Australia as a highly competitive destination for early and ongoing investment in these technologies.

Summary of key initiatives

Whole-of-government initiatives

The Australian Government will develop foundational capabilities and processes to form an operational ecosystem that is scalable, efficient and adaptable as the emerging aviation technology sector evolves. The Department of Infrastructure, Transport, Regional Development and Communications (DITRDC) in collaboration with state, territory and local governments and relevant Commonwealth agencies and authorities will develop:

1. A Drone Rule Management System (DRMS) to coordinate and manage operating rules for drones from different agencies across Commonwealth, state, territory and local governments. This will include operating boundaries or rules related to security, noise, privacy, environmental impacts and cultural sites.
2. Coordinated enforcement schemes to enable state and territory law enforcement authorities to manage minor breaches of rules and regulations related to drone operations.
3. A National Drone Detection Network (NDDN) consisting of scalable and modular infrastructure to facilitate the detection of drones to protect assets, activities and events in the air and on the ground. The system will consist of a modular and scalable network of drone detection sensors, linked to a central database, which can filter and provide appropriate data to a wide range of users.
4. A NEAT infrastructure planning framework consisting of clear principles and processes to ensure effective and efficient coordination of planning decisions related to construction and operation of electric vertical take-off and landing vehicles (eVTOL) and drone take-off, delivery and landing sites.

Unmanned Aircraft System Traffic Management

Australia will take an iterative approach to developing Australia's Unmanned Aircraft System Traffic Management (UTM) system. UTM will support the management of a range of risks and impacts associated with emerging aviation technologies, including safety, security, noise, privacy and environmental issues.

5. DITRDC will prepare an Action Plan for the development, deployment and management of UTM informed by advice and input from industry, the Civil Aviation Safety Authority (CASA), Airservices Australia (Airservices), Defence and other relevant government agencies and regulators.
6. Airservices will develop and manage a Flight Information Management System (FIMS) to underpin the UTM ecosystem and serve as an interface with the broader Air Traffic Management (ATM) system to ensure effective management and safety of Australian airspace. FIMS will support a mix of centralised government services and delegated service delivery by industry providers operating in an open and competitive market.

Regulatory modernisation

The Australian Government will undertake regulatory development and reform aimed at ensuring that approaches to managing risks and impacts associated with emerging aviation technologies are outcome focused, risk based and proportionate.

7. CASA will prepare an aviation safety regulatory road map in 2021 in consultation with industry for the future development of safety regulation of drones and AAM.
8. The Australian Government will develop an approach for the integration and wider incorporation of emerging aviation technologies into Australia's airspace system as an element of a broader strategy to modernise Australia's approach to airspace design and management. CASA will prepare an implementation plan for Australia's Future Airspace Framework in 2021–22 to give effect to the Australian Government's airspace policy.
9. DITRDC will work with state, territory and local governments to develop an outcomes-based noise framework for emerging aviation technologies utilising UTM.
10. The Australian Government will continue to adopt a technology-neutral approach to legislation and regulations to manage privacy concerns. DITRDC will work with Commonwealth, state and territory government agencies to provide clear, practical guidance on how operators can meet their obligations under relevant privacy legislation and minimise the privacy impacts of their operations.
11. The Australian Government will review and amend legislation to enable the effective implementation of security measures, including cyber security requirements, infrastructure security requirements and improved management of counter-drone capability approvals.

Industry support

The Australian Government will support the adoption of emerging aviation technologies in partnership with industry:

12. The Australian Government will establish the Emerging Aviation Technology Partnership (EATP) program to support local manufacturing and the commencement of new operations that address priority community needs to enter into commercial service. DITRDC will manage the EATP program, with support from other government regulators and service providers.
13. DITRDC will prepare best-practice guidance material to promote the consideration of emerging aviation technologies within government procurement processes. DITRDC will work with Commonwealth, state, territory and local government agencies to encourage adoption of these guidelines.
14. DITRDC will develop a web-based portal to serve as a coordinated source of information regarding regulatory process, procedures, government support programs and other relevant information to support operational and investment decisions by the commercial drone and AAM industry.

Medical items being loaded into a drone for delivery. Image courtesy of Swoop Aero.

Indicative timeline for implementation of key initiatives

Initiative		2021	2022	2023	2024
1	Drone Rule Management System	Develop framework	Development and testing	Initial operations	
2	Develop a coordinated approach to enforcement	Develop framework	Enact necessary legislative changes at the Commonwealth, state and territory levels		Complete
3	National Drone Detection Network	Detailed system design	System development and implementation	Initial operations	
4	Infrastructure Planning framework	Develop and agree framework		Complete	
5	UTM Action Plan	Consultation and development	Implementation ongoing		
6	Flight Information Management System	Prototype development	Technology partner selected	Initial operations	
7	Aviation Safety Regulatory Road Map	Develop and consult	Implementation ongoing		
8	Australia's Future Airspace Framework	Develop framework	Implementation of regulatory changes		Complete
9	Noise framework	Develop framework	System development and testing	Initial operations	
10	Privacy guidance	Development	Published		Review
11	Security measures	Development	Enact legislative changes	Complete	
12	Emerging Aviation Technology Partnerships	Program development and implementation	Partners selected and program operational		Review
13	Best-practice procurement guidance	Development and distribution	Monitoring and evaluation		
14	Drone Information Hub	Development	Complete		

SB4 Phoenix solar drone about to take-off for waterpoint monitoring. Image courtesy of Sunbirds.

Core principles

The Australian Government will pursue an approach to developing and managing the emerging aviation technology market, including aligning all government regulation and service delivery, that embodies the core principles identified below.

The following core principles will be applied and viewed through a lens of enabling drone, eVTOL and other emerging aviation technology operations and encouraging investment:

Members of AMSL Aero Pty Ltd and Careflight teams demonstrating the aeromedical capability of Vertiia.
Image courtesy of Careflight.

Opportunities

The impact and spread of economic benefits and jobs from drone and eVTOL applications continues to grow exponentially. In addition to the direct economic benefits, efficiencies and jobs in development, manufacturing and operations, the sector will attract significant investment in other complementary services, industries, infrastructure and technology.

Drones and eVTOL vehicle manufacturers and operators, while industries in themselves, are key enablers of economic growth through the movements of goods and people. The Australian Government commissioned Deloitte Access Economics to quantify the potential economic benefits and savings broader drone and eVTOL use could have on the Australian economy over the next five, 10 and 20 year periods.

Key findings include:

Source: Deloitte Access Economics

An opportunity also exists for the Australian Government to develop a holistic approach to managing the sector by drawing together the range of systemic and interdependent issues to produce efficient processes to reduce red tape for the sector.

Challenges

Rapid growth in the sector is creating a number of systemic challenges that could stifle further growth if not managed effectively:

- **Increase in scale and complexity:** The risks and social impacts associated with these operations also increase and become more complex and challenging to effectively manage as operations scale and increase in complexity. Processes and systems that enable the sector need to be able to scale effectively as the number of operations grow.
- **Spread of jurisdictional responsibility:** Responsibility for management of different risks and social impacts is spread across agencies and jurisdictions. As approaches to manage these issues develop, there is a significant risk of overlapping or inconsistent approaches, which will create a complex regulatory environment. The cumulative impact of different regulatory regimes could also make regulatory impacts unsustainable and stifle growth in the industry.
- **Enforcement:** Some existing regulations are challenging to enforce largely on account of difficulties in identifying the actual drone operator where breaches have occurred, reducing the ability in some cases to take appropriate enforcement action.
- **Rapid evolution:** Emerging aviation technologies are evolving rapidly, and the approach to managing the sector must have the flexibility to continuously adapt and evolve to reflect these changes.

Meg Kummerow from Fly the Farm undertaking drone training. Image courtesy of UAS Pacific.

A competitive and efficient aviation sector

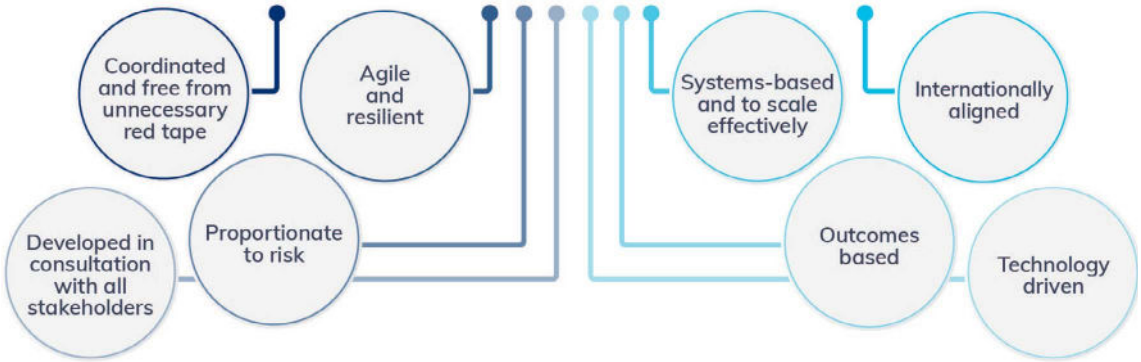
Above: A Swoop Aero medical logistics drone operating in a city. Image courtesy of Swoop Aero.

Market management

The Australian Government will utilise a range of different tools to manage and frame the emerging aviation technologies market, such as regulations, oversight, service provision, industry support and guidance. This will aim to enable the sector to grow in a manner that is safe, secure and considerate of the community and the environment.

The Australian Government's market management approach will be aligned with and informed by the necessary requirements to enable core industry operational use cases, having regard to short, medium and long-term technology horizons. Priority will be directed towards enabling use cases where there is immediate or near-term demand, to those that provide a foundation for further industry growth and to align with broader government priorities.

The Australian Government will support a strong and vibrant emerging aviation technology sector through a market management approach that is:



Whole-of-government approach

The Australian Government will develop foundational systems and processes that will work together to form an operational ecosystem that is scalable, efficient and adaptable as the emerging aviation technology sector evolves. DITRDC, in collaboration with state, territory and local governments and relevant Commonwealth agencies, will develop an approach that includes the following key elements:

Drone Rule Management System (DRMS) – A system for coordinating drone rules and operating boundaries made by different agencies and governments related to security, privacy, noise and environmental concerns. This will provide a coordinated and consistent framework within which different agencies can request necessary rules, and provide operators with a single source of information about all the relevant rules for their operations.

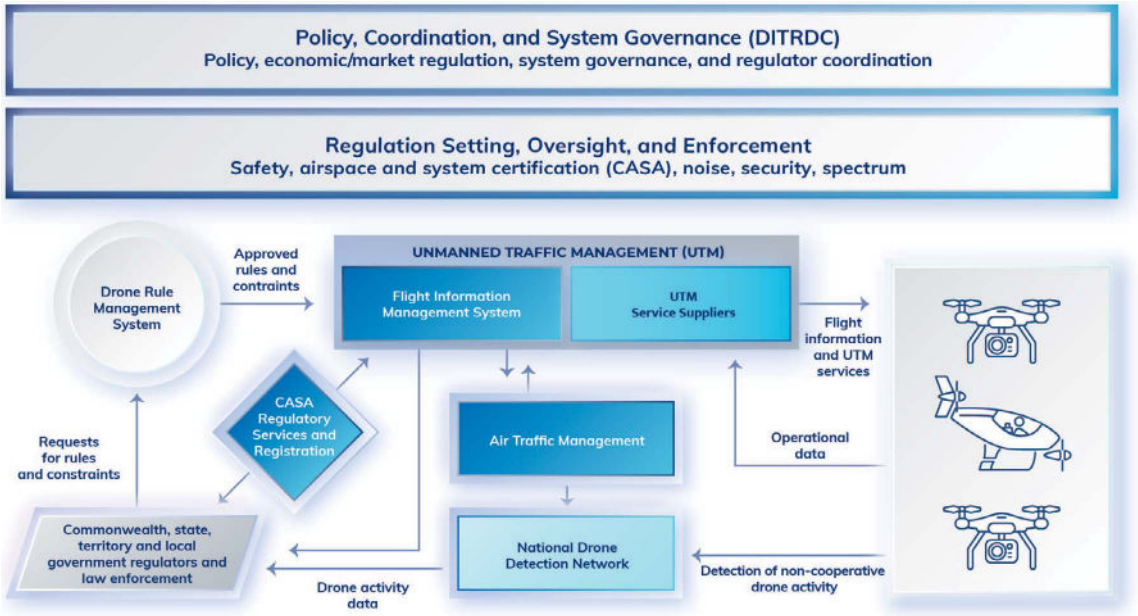
Unmanned Aircraft System Traffic Management (UTM) ecosystem – UTM is expected to become an essential component to support safe integration of multiple operations in busy airspace. The UTM ecosystem will also provide information on rules and operating constraints developed through DRMS so that operators can easily access this information.

Review and rationalise enforcement of rules – Improve the management of minor breaches of rules and regulations. This will empower state and territory police to issue warnings and fines for minor breaches of drone rules, increasing public confidence that drone activity is being managed safely and effectively.

National Drone Detection Network (NDDN) – A coordinated system of scalable and modular infrastructure to detect drone activity and provide relevant data to a wide range of users. The NDDN will initially focus on addressing priority security risks associated with drones, but as it grows, it will provide valuable data to support simplified enforcement of other rules, including safety regulations and airspace rules in DRMS.

The Test and Evaluation team from Nova Systems (Dr Terry Martin, Kristian Cruickshank and Guy Morris) oversee the flight details of an airborne platform from V-TOL Aerospace, as it works through the sortie objectives. Image courtesy of Dr Terry Martin.

National Emerging Aviation Technologies Ecosystem



Development of the National Emerging Aviation Technologies ecosystem will be supplemented by:

- **Whole-of-government coordination** – New processes to improve management and coordination between Commonwealth, state and local government agencies for infrastructure regulation and planning requirements.
- **Regulatory reform** – Continuing regulatory reform and development initiatives aimed at ensuring that approaches to managing all the relevant risks and impacts associated with emerging aviation technologies are outcomes focused, risk based, transparent and proportionate. This includes legislation for safety, airspace integration, security, noise and privacy.
- **Industry support** – Targeted support for the adoption of emerging aviation technologies in partnership with industry, focused on operations that have the greatest potential to benefit the economy and address priority community needs.

Competition

The requirement that airspace is administered as a national resource will be retained, in addition to retaining safety, efficiency and equitable access requirements for drone and eVTOL operations, consistent with the broader approach to airspace administration.

Approaches to regulation of the sector will be managed to ensure equitable access to airspace and the needs of current and future airspace stakeholders are balanced fairly. Matters of competition and fairness will require coordination across government. This will be managed by DITRDC who will work with relevant stakeholders to ensure specific rulesets do not unintentionally impact on competition or fairness.

The increasing and projected scale of drone and eVTOL operations will also add complexity to airspace access. Access to particular airspace volumes or routes, along with access to ground-based infrastructure is finite. This will necessitate appropriate consideration, development and application of rules relating to priority of operations to ensure operational clarity to support the projected scale of operations in the future. Future approaches to manage competition and fairness issues that may arise due to an increase in the scale of operations will be considered by the Australian Government in early system design to support the ability to manage such issues in future evolutions of systems or the market.

The increasing digitisation and the reliance on digital platforms will pose new challenges to ensure the fair use and fair access to airspace is enabled. The emerging use of data and algorithms to manage airspace access has the potential to be gamed and inappropriately manipulated for commercial advantage.

Regard to potential anti-competitive behaviours and outcomes is required when developing regulations, service delivery models and associated technology. This will necessitate continued efforts by the Australian Government to manage these matters into the future to ensure an open, fair and competitive aviation market can flourish.

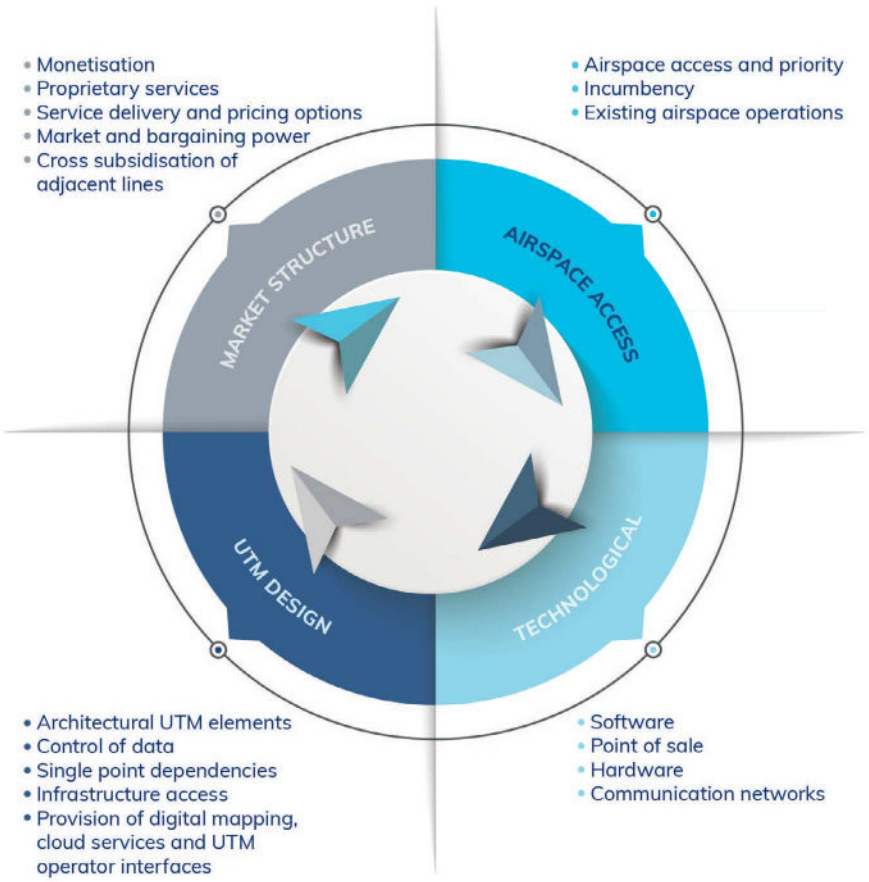


Figure. Examples of areas where anti-competitive behaviour can emerge.

Government fees and charges

New government services developed to enable the operation of emerging aviation technologies, such as drones and eVTOL vehicles, will be cost-recovered from the users of those services and considered as part of the broader Australian Government's cost-recovery principles. The Australian Government will consider a phased introduction of cost-recovery in recognition that the nascent sector may not be able to support the development and implementation of enabling infrastructure, and pursue a transition towards sustainable and appropriate cost-recovery arrangements for services as the industry matures.

The Australian Government will actively manage the whole-of-government cost impost on the sector through opportunities to better leverage economies of scale and remove unnecessary red tape through increased coordination and consistency of government approval processes. In the development of new cost-recovery schemes, the Australian Government will ensure the appropriate transparency for the costs of services provided, be proportionate to the services delivered and ensure accountability for adequate performance targets for the timely, efficient delivery and quality of government services.

The Australian Government will consider opportunities to 'carve out' instances where cost recovery measures won't be applied when deemed in the national interest, such as emergency and humanitarian services, medical support, search and rescue, or public safety operations.

Vertiia prototype aircraft photographed at event for announcement of partnership between AMSL Aero Pty Ltd, developer of Vertiia aircraft and Careflight, aeromedical provider Nov 2020. Image courtesy of Careflight.

International harmonisation

It is recognised through the work of the Australian Government, CASA, Airservices, and Australian industry and academia over the last decade or more that Australia is well placed and often world-leading, which has attracted and enabled a significant number of innovation opportunities in both the drone and AAM domains. The Australian Government will continue to provide leadership and advancement where appropriate, practical and in the national interest, such as measures to enable regional and remote operations in recognition of the significant potential benefit of these operations for the Australian economy.

This leadership may take the form of active participation in international fora, to share Australia's experience and lessons, promote Australia's innovation and approach to best-practice standards, and participate in broader international harmonisation efforts to support the continued development of the sector.

It is also recognised that a significant body of work and advancements have been progressed by foreign governments and industry led fora to advance drone and AAM operations. The Australian Government will look closely at international models and standards, and carefully consider leveraging these where it is in Australia's national interest and fit-for-purpose for our unique local environment and administrative arrangements.

Australia will pursue efforts to support, and contribute to the development of, best practice international harmonisation in the following key areas:

- ATM/UTM systems, including protocols and use of data;
- safety approaches and requirements;
- training and competency requirements;
- equipment design, manufacture, flight operation standards and airworthiness certification of drone and eVTOL aircraft and support systems;
- infrastructure standards;
- environmental and sustainability standards;
- noise standards; and
- security standards.

This list of priorities is not exhaustive and Australian Government officials may also participate in fora to support emerging issues or other related matters in the national interest.

A safe, secure and environmentally sustainable aviation sector

Above: A drone operator capturing photographs of a construction site to create an exact digital twin, allowing stakeholders to remotely monitor progress and reduce physical site visits. Image courtesy of Trendspek.

Safety regulation

The Australian Government will continue to consider safety and security as primary considerations in the management of drone and AAM operations.

CASA, as an independent statutory authority, will continue to be responsible for the safety regulation of civil air operations in Australia. CASA is well regarded as a mature and progressive regulator, and has presided over a world leading regulatory approach that has enabled significant commercial drone operations and testing of prototype eVTOL vehicles. This approach will be maintained by CASA whilst working with industry to outline the evolution of future elements of the approach to safety regulation to provide certainty for industry investments and planning for future operations within Australia.

CASA will continue the development of standard scenarios, where the safety risks and appropriate mitigations are well established, to help ease the burden on industry from having to develop bespoke operational procedures. CASA will also continue to develop guidance material to assist industry to understand its safety obligations and to streamline the application process.

As the sector and the risks and mitigations associated with different operational use cases and operational scenarios evolve, CASA will respond by ensuring legislation, guidance material and standard scenarios remain fit for purpose.

The Australian Government recognises the potential economic benefits to Australia of specialised operations including Beyond Visual Line of Sight (BVLoS) and semi-autonomous operations in regional and remote areas of Australia, and their applications in agriculture, mining, construction,

goods delivery and emergency aeromedical transport services. CASA will continue to support these specialised operations, including through the enhancement of its guidance material and increasingly efficient regulatory approval processes.

Similarly, there is potential to support significant economic development through increased connections to regional and remote markets through AAM. Enabling regional air mobility operations for intra-regional operations and regional-urban operations will continue to be progressed alongside processes to enable urban operations within cities.

Acceptable levels of safety performance

Regulations and performance objectives will ensure that the level of safety performance required from the introduction of new technologies will meet society's expectations in relation to aviation activity. The acceptable level of safety performance for emerging aviation technologies will be harmonised with international approaches where appropriate for the Australian context.

Acceptable levels of safety performance should avoid a 'one size fits all' solution and will be linked to traceable safety indictors and performance requirements, considering, but not limited to: purpose of operations, the airspace in which the operations are to be conducted, the ground environment over which it is operating, consideration of safety data, and the broader ground, air and societal risks that are to be mitigated.

Technical and procedural solutions are also options that can be deployed within different classifications of airspace to achieve levels of safety performance. These will be developed in consultation with stakeholders by the various responsible agencies as the development of standards are further refined during the development of this industry.

Aviation Safety Regulatory Road Map

In 2021, CASA will work with government agencies and industry to develop an aviation safety regulatory road map for the future development of safety regulation of drones and AAM. The inclusions for consideration in the road map are outlined in Appendix 1.

Advanced Air Mobility (AAM)

The Australian Government recognises the potential for AAM to significantly shift the operating dynamic of the aviation industry by providing new low-cost short-haul options for on demand and flexible aerial transport, without the need for significant investments in supporting infrastructure. There are significant benefits that can be gained from the use of eVTOL and other new technologies to bridge the tyranny of distance to connect people, goods and services with regional and remote areas of Australia. There is also a role for AAM to support busting congestion in Australian cities.

CASA, with support from government agencies, will consider the range of necessary requirements to continue to support AAM operations, such as:

- pilot training and licensing;
- technical and maintenance profession standards;
- vehicle certification standards and processes;
- operating rules, standards and approvals;

- vertiport requirements;
- pathways for increasing automation; and
- approval processes for testing, trials and for entry into full commercial service, including for piloted, remotely piloted and spectrum of automation (partial to full).

CASA will continue to work with the AAM sector to implement the broad range of unique requirements to enable the initial introduction of AAM services, likely within the existing ATM approach, and to support the evolution of future operational needs such as appropriate concepts of operations for air traffic management and communication, navigation and surveillance; UTM services; and enabling the increasing levels of automation.

Airspace

The Australian Government will develop a policy approach for the integration of relevant emerging aviation technologies into Australia's airspace system as an element of a broader strategy to modernise Australia's policy approach to airspace design and management.

The Australian Government will release a National Strategic Airspace Policy Issues Paper for consultation. The purpose of this discussion paper is to provide an opportunity to contribute to ongoing discussions to support the development of a national framework for the long-term strategic policy approach for the management and administration of Australian airspace. This paper aims to:

- clarify the basis upon which Australian airspace is currently administered, designed and classified;
- present a number of possible options for airspace classification and airspace design;
- provide an avenue for the presentation of other input and suggestions for airspace classification and airspace design;
- articulate consequential issues associated with potential airspace solutions; and
- inform the Australian Government's broader approach to airspace management.

The National Strategic Airspace Policy Issues Paper includes consideration of options for the administration and regulation of Australian airspace, including airspace volumes relevant for emerging aviation technologies and the future integration of such technologies into various classes of airspace.

Feedback on the National Strategic Airspace Policy Issues Paper will inform CASA's development of Australia's Future Airspace Framework (AFAF) in collaboration with other relevant government agencies, industry and other stakeholders. The development of the AFAF will be closely coordinated with the ongoing development of other relevant policies, regulations and services for emerging aviation technologies whilst ensuring that Australia's airspace remains at the highest levels of safety, security and efficiency in the world.

Noting the regulation of airspace is currently driven primarily from a safety lens, there will be a need for the provision of services to mitigate additional risks and impacts that do not relate to safety, efficiency and national security, such as noise, privacy, critical infrastructure, sensitive sites and the environment. This approach is a significant shift from the existing approach to airspace administration and regulation and will necessitate the consideration of the additional risks and impacts not only from an airspace safety perspective, but also to ground based impacts due to the operation of drones and AAM.

Existing airspace design and management arrangements will remain in place while efforts progress to develop additional measures to support the increased integration of relevant drone and AAM operations into Australian airspace consistent with government policy to facilitate industry requirements and developments. The AFAF will include the following non-exhaustive indicative building blocks to guide the approach for:

- a future airspace design concept to accommodate drone, AAM and other operations to facilitate flexibility for future technological developments;
- defining parameters for the detection of drones/AAM or conventional aircraft using electronic conspicuity devices to enhance airspace safety;
- ensuring rules-based equitable access to relevant airspace or areas of operation;
- developing a graduated systems approach to managing risks within the UTM ecosystem;
- defining equipment standards for different airspace to ensure an acceptable level of safety performance is achieved;
- automated decision support services; and
- a long-term plan and timetable for the transition towards a combined airspace traffic management model to enable full integration of drones, AAM and traditional airspace users where necessary.

Cyber and physical security

The Australian Government will adopt a security- and safety-by-design approach towards the cyber resilience of UTM and component systems, including the FIMS. This includes mitigating vulnerabilities of systems that interface with a UTM and its subsystems. Cyber security will also be an essential component of other systems implemented for emerging aviation technologies.

The Australian Government will also consider the future inclusion of 'cyberworthiness' standards relating to unmanned and autonomous aircraft and their systems. This will be consistent with whole-of-government policies regarding cyber security and harmonised with international approaches where possible.

The Australian Government will continue to develop policies, processes and regulations to improve appropriate access to counter-drone capabilities. This will include improved coordination of capabilities between agencies and governments to ensure a range of users have improved access to data on drone activity to manage security risks, and that interdiction capabilities can be deployed where appropriate.

DRMS will include management of rules relating to the security risks associated with drones, including permanent, temporary and emergency restrictions to protect assets, sites, activities and events where drones may present a security risk.

DITRDC will work with Home Affairs to develop appropriate security regulation for AAM, including requirements for AAM and vertiport operators. This will include consideration of:

- identity security through Aviation Identification (AVID), Aviation Security Identification Card (ASIC) or other schemes;
- the applicability of existing aviation security regulation in Australia such as the *Aviation Transport Security Act 2004* and Aviation Transport Security Regulations 2005 (ATSR), and transport security programs; and
- whether some vertiports may require airside security zones and/or secure areas.

National Drone Detection Network (NDDN)

DITRDC will lead the development of a coordinated system of scalable and modular infrastructure to detect drone activity and provide relevant data to a wide range of users. The NDDN will initially focus on addressing priority security risks associated with drones, but as it grows will provide valuable data to support enforcement of other rules and regulations related to drone use.

Noise

DITRDC will lead the development of an outcomes based noise framework for emerging aviation technologies utilising UTM, in consultation with state, territory and local governments.

The noise framework will include:

- consistent processes for measuring the noise output of new aircraft types. These processes will be aligned where appropriate to international standards as these are developed to support international harmonisation;
- modelling of noise impacts at ground level, through UTM and related technologies;
- regulation based on the noise impact at ground level. This will include consideration of cumulative noise impacts; and
- a defined number of agreed standard noise threshold settings, developed in consultation with state, territory and local governments. This will allow relevant state, territory or local governments to select the appropriate settings for noise thresholds that reflect the noise sensitivity of particular areas, sites or communities while providing a transparent approach to drone operators.

Noise impacts associated with take-off and landing sites will also be considered as part of the infrastructure planning framework.

Privacy

Many of the privacy concerns related to emerging aviation technologies are not unique to the sector, and reflect broader concerns about privacy associated with new technology. The approach to managing privacy concerns from new technology should be technology-neutral, and new rules specific to drones should only be introduced where there are specific issues that cannot be addressed with more general privacy legislation.

DITRDC will work with Commonwealth and state agencies to provide clear, practical guidance on how drone operators can meet their obligations under relevant privacy legislation and minimise the privacy impacts of their operations.

The Australian Government will continue to implement systems that will improve the enforcement of drone rules and regulations, allowing Commonwealth and state authorities to take action more easily against drones that infringe relevant privacy or trespass legislation.

DRMS will include management of rules related to the use of drones in sensitive locations where there are likely to be significant privacy concerns.

Privacy of drone operators and their customers is also a significant concern that will be carefully managed. Any new systems developed by the Australian Government to manage emerging aviation technologies will be subject to a Privacy Impact Assessment. This includes systems related to drone detection and UTM. These assessments will ensure that the systems developed considers the impacts on the privacy of individuals, and will include recommendations for maximising compliance and managing, minimising or eliminating that impact.

Koala populations have declined by as much as 80% in some areas. Drones are being used to find out how many there are and where they are located. The key is making conservation cost-effective. Image courtesy of DJI.

Environment

There are a range of operating rules regarding the use of drones in national parks and state parks in order to protect the sensitive environments and the enjoyment of pristine nature areas. However, such rules are not coordinated or consistent across jurisdictions.

DRMS will include management of rules related to the use of drones in national parks, state parks and other sensitive habitats.

Noting the obligation to take environmental considerations into account under the *Civil Aviation Act 1988* and *Airspace Act 2007*, it is not expected that current or planned operations of emerging aviation technologies are likely to meet the trigger for assessment under the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999*. This will be monitored as the sector grows and the scale of operations increase, and the need for EPBC Act assessments will be considered as necessary.

New research is continuously improving understanding of the ecological impacts of emerging aviation technologies, including small drones and larger eVTOL vehicles. As more research is conducted and the impacts are better understood, the approach to managing these impacts will continue to evolve, and new measures may be introduced.

The adoption of emerging aviation technologies will also support the achievement of sustainability targets for the aviation sector.

Cultural sites

DRMS will include management of rules related to the use of drones at sensitive cultural sites. This will include situations where the permission of the traditional owners of a site is required before drones can be used in the vicinity of the site.

Preparing for new technology

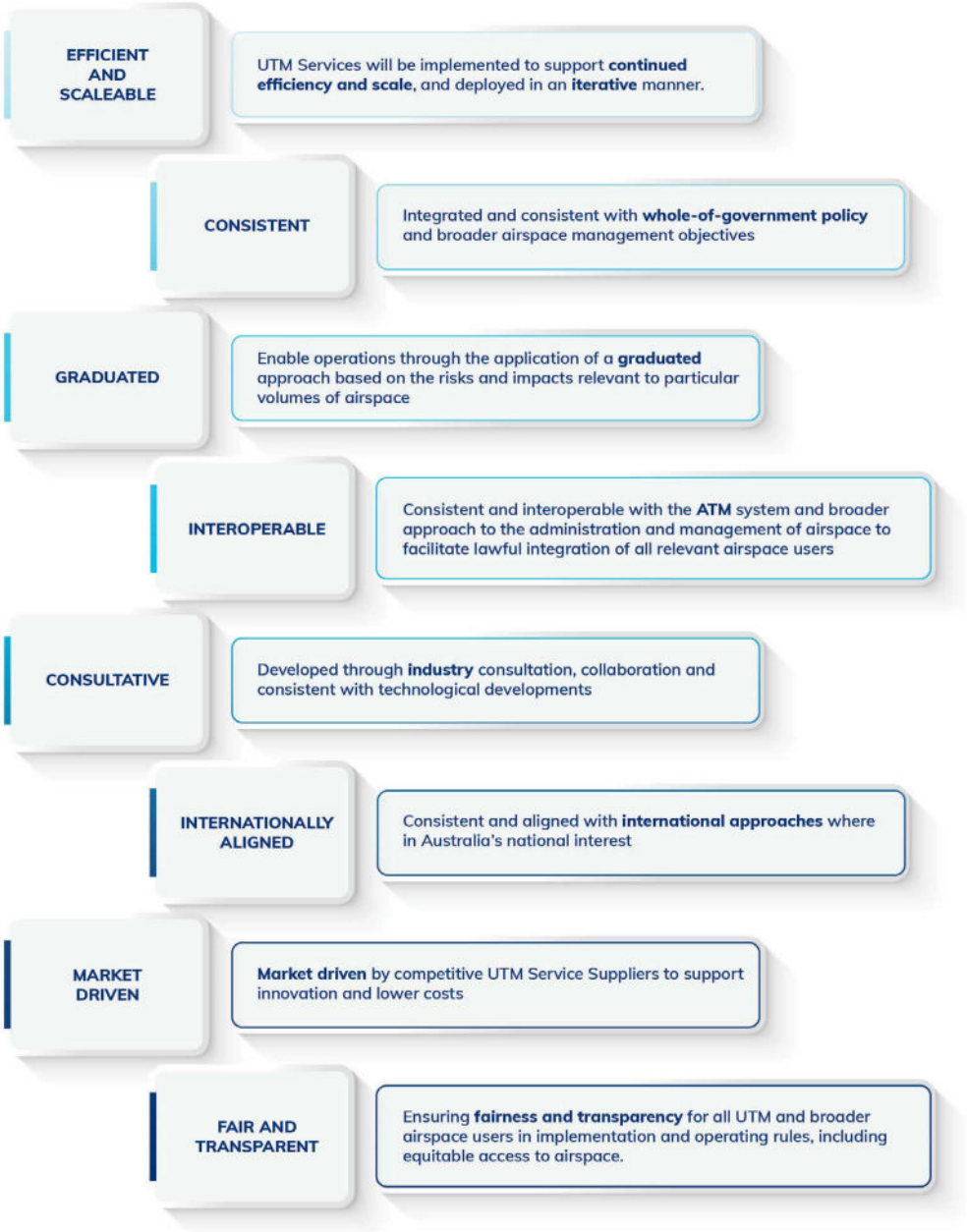
Above: Drones are reducing the cost and time of carrying out tasks that often relied on manual and dangerous labour. Image courtesy of DJI.

Development and management of UTM ecosystem

The Australian Government is committed to the development and management of a safe, secure, efficient, open, and market driven UTM ecosystem. Australia's UTM ecosystem will enable cost-effective, efficient and easy access to mission critical data and rules (safety, security, noise, privacy and environmental among others) for end users to support lawful drone (and future AAM) operations. Australia's UTM ecosystem will enable centralised government services and data (via the FIMS where appropriate), and industry developed services and data.

The UTM ecosystem will support the continued efficient operational management of Australian airspace by Airservices through the development and management of a FIMS, which will also provide an interface to the broader ATM system to ensure the effective management of the airways system. The UTM ecosystem, including the FIMS, will also support compliance with all operating rules as set by various agencies and regulators including CASA, DITRDC, and Home Affairs along with state, territory and local governments, and support interoperable distribution of information between government and end users.

The following guiding principles will underpin the development and management of the UTM ecosystem:



UTM Action Plan

DITRDC will prepare an Action Plan for the development and deployment of UTM in consultation with industry, CASA, Airservices and other relevant government agencies. Further details of the UTM Action plan are outlined in Appendix 2.

Drone Rule Management System (DRMS)

DITRDC will develop a whole-of-government system to coordinate and manage rules and constraints applicable to drones from different agencies and regulators across Commonwealth, state, territory and local governments. This will include non-safety related rules related to security, noise, privacy, environmental impacts and cultural sites.

This system will be complementary to, and integrated with, rules and regulations developed by CASA to ensure safety of drone operations. Rules within the system will be subject to oversight to ensure that any operating boundaries of conditions imposed do not compromise safety.

Rules and constraints in the system will be guided by the following principles:

- Targeted - any rules implemented are to address a specific risk or impact;
- Outcomes focused - giving operators flexibility in how the risk or impact can be addressed (through aircraft design, flight path, altitude etc.); and
- Proportionate - enacting the minimum restriction or disruption on operations needed to effectively manage the risk or impact.

DRMS will accommodate local input and decision making within the constraints of an agreed nationally consistent framework. The Australian Government will work with state and territory governments to design and agree the framework.

The following table provides an illustrative, non-exhaustive list of the types of rules that will be considered for inclusion in DRMS.

Security boundaries		Noise Rules	Environmental rules	Privacy rules	Cultural site rules	Emergency Services
Critical Infrastructure	Embassies	Residential areas	National Parks	Schools	Indigenous cultural sites	Police operations
Corrections Facilities	National security operations	Public parks / recreational areas	State Parks	Swimming pools	War memorials	Fire-fighting operations
Immigration Detention Facilities	Major events	Noise sensitive livestock (horses, chickens etc.)	Registered sensitive habitats	Farms		Search and rescue operations
Government buildings	Defence sites and activities					
Official residences						

For each type of operating boundary or condition, there will be:

- clear criteria for when and how a boundary or condition can be implemented;
- processes for specific government agencies or organisations to apply for an operating boundary or condition;
- processes for a Commonwealth agency to assess requests against the criteria, and accept, amend or reject the request as appropriate;
- Processes for users to access relevant data and appropriate airspace/environment data regarding a reported infringement;
- processes for undertaking reviews or appeal of airspace boundary or restriction that have been implemented; and
- processes for requesting an exemption/exception for operating boundaries for specific operators or operations.

Enforcement of rules

While the Australian Government will ensure all rules are appropriate to promote lawful drone operations, effective enforcement arrangements will also be required.

The Australian Government will develop a new enforcement framework to allow state and territory police to issue infringement notices and enforce minor breaches of rules and regulations related to drone rules.

Serious offences committed using drones will continue to be prosecuted under existing legislation in the relevant jurisdiction. DITRDC will work with states and territories to consider an appropriate legislative framework to support these arrangements.

Residential customers in Canberra, Australia receive packages delivered by drone. Image courtesy of Wing.

Infrastructure development and access

While drones and eVTOL vehicles do not require significant physical infrastructure investment, such as airports, rail or highways, nevertheless they still require some unique infrastructure, albeit on a much smaller scale and cost. Infrastructure will also have an impact on market access, including flight paths, in addition to the impact on surrounding communities.

With AAM shaping up as a significant disrupter in passenger transport, considerations will be required for integration with existing transport hubs, such as train stations, airports or road-based transport terminals. Smaller drones will require access to safe and secure landing or delivery sites throughout the community.

The Australian Government will work with state, territory and local governments to develop a National Emerging Aviation Technologies infrastructure planning framework to support the integration of drones and eVTOL vehicles in the community and broader transport networks.

This will consist of clear principles and processes to ensure effective and efficient coordination of planning decisions related to the design, construction, maintenance and operation of eVTOL and drone take-off, delivery and landing infrastructure. The goal of this framework will be to provide as consistent and seamless a process as possible for operators and infrastructure developers to navigate the required regulatory approvals and requirements across jurisdictions. The framework will also provide guidance for planning authorities to understand the implications of emerging aviation technologies and make informed planning decisions for their communities.

The framework will include consideration of:

- Safety regulation of take-off, landing sites and delivery infrastructure by CASA (where relevant);
- Security requirements and regulation (where relevant);
- Infrastructure for air navigation purposes;
- Radiofrequency spectrum requirements and allocation;
- Air navigation services provided by Airservices (where relevant);
- Commonwealth and state noise regulations, including the role of noise impact modelling to inform planning decisions where appropriate;
- Market regulation of infrastructure, including competition aspects (such as shared/ multi-operator vs private).
- Airspace capacity management;
- Multi-modal transport asset and service integration implications;
- Any other relevant state, territory or local government planning considerations; and
- Scalable solutions for different operational contexts: remote, regional and urban environments.

Spectrum

The wireless communications links used by emerging aviation technologies rely on access to radiofrequency spectrum, which is regulated by the Australian Communications and Media Authority (ACMA) under the *Radiocommunications Act 1992*. Radio frequency spectrum provides both the command and control functions (e.g. telemetry, radar and navigation) and payload communications (e.g. high-resolution video) for traditional and emerging aviation technologies.

The spectrum frequencies for core aviation functions are set by the International Telecommunications Union's Radio Regulations (the international treaty governing the global use of spectrum) with input from the International Civil Aviation Organisation. These frequencies are incorporated into the Australia Radiofrequency Spectrum Plan that is made by ACMA.

Within this framework, the future spectrum needs for emerging technologies are considered by ACMA on an ongoing basis, including in its five-year spectrum outlook process that involves annual public consultation to seek stakeholder views.

ACMA will continue to consider the future spectrum needs for emerging aviation technologies, and seek stakeholder views through its usual processes. DITRDC and ACMA will conduct a workshop in mid-2021 to develop a coordinated industry perspective on future spectrum requirements to inform ACMA processes.

Insurance

The Australian Government will commence a study regarding the necessity and adequacy of insurance requirements to manage risks associated with the use of emerging aviation technologies.

Amongst the range of relevant issues, this study will consider the risks of damage associated from the use of drones, the broader suite of measures to manage drone safety, and the cost impacts of insurance on the development of the sector. This will aim to assist the industry to make decisions about suitable insurance options within the emerging environment of drone and eVTOL operations, and to consider the appropriateness of any potential mandatory insurance requirements.

The Australian Government recognises the potential impact of a mandatory insurance scheme on the continued innovation and operating costs for the diverse range of drone and eVTOL vehicle applications, and that in most cases, decisions about necessary insurance requirements are best handled by operators as part of individual approaches to risk and liability management.

Hover UAV CEO, Jackie Dujmovic demonstrates one of the many public safety and emergency response uses for drones, including delivery of medical equipment such as portable defibrillators. Image courtesy of Hover UAV.

Industry support

Above: A drone is testing a proprietary fog dispersal system from Pypervision for clearing fog from airport runways. Image courtesy of Hover UAV.

Emerging Aviation Technology Partnerships (EATP)

The Australian Government will establish the Emerging Aviation Technology Partnerships (EATP) program.

The EATP program will consist of strategic partnerships with industry to support manufacturing and the demonstration of of emerging aviation technology platforms (such as electric engines, drones and eVTOLs) to address priority community, mobility and cargo needs in regional Australia. This will support the digital transformation of Australian businesses, increase business efficiency, and reduce carbon emissions through new technology.

The EATP will provide opportunities for a number of industry partners to demonstrate their capability with emerging aviation technology platforms in five key areas that show significant opportunity to benefit the economy and community, particularly in regional Australia. The first of these supports the research, design and manufacture of electric propulsion systems in Australia.

The EATP will involve government-industry partnerships in five key streams:

- growing manufacturing jobs in electric aviation;
- improving health outcomes for remote indigenous communities;
- connecting regional communities (passengers);
- digital farming; and
- boosting regional supply chains.

Applications for EATP partners will be sought from local and international industry and assessed based on a competitive basis in regards to the criteria for each scenario, with an emphasis on Australian operators or international operators planning local investments in jobs and operations. EATP will also provide a viable pathway to market for Australian aviation technology developers and operators without having to go overseas.

The EATP will provide government with a valuable opportunity to refine approaches to regulation and digital service delivery models in real-world operational scenarios that will position government to accommodate and enable operations with increased complexity and at a greater scale.

Government procurement

The Australian Government recognises the range of potential applications for drones and eVTOL vehicles in the delivery of government services. These technologies can be deployed in a wide variety of situations and deliver significantly cheaper and efficient outcomes than achievable with existing models, such as in regional healthcare, firefighting, telecommunications connectivity and many more. This is even possible in requests for services that have not considered the possibility or impact of using emerging aviation technologies.

The Australian Government notes the availability of opportunities for the local adoption of drone and eVTOL technology will support a strong Australian based manufacturing and design industry, and improve Australia's competitiveness for international investment.

DITRDC will prepare best-practice guidance material to promote the consideration of emerging aviation technologies within government procurement processes. DITRDC will work with Commonwealth, state, territory and local government agencies to encourage the adoption of these guidelines.

Drone Information Hub

The Australian Government recognises the importance of enabling access to information regarding regulatory requirements and process, and government programs to effectively enable industry operators to plan for operations and comply with legal requirements. Such information is vital to providing the certainty for industry operations and investments.

At present, the range of information required to inform compliance and operational requirements is spread across a range of government agency websites.

DITRDC will develop a user-centred web-based portal to serve as a centralised location directing visitors seeking information about drone use, related policy, rules and regulations to specific resources on various linked websites, including the CASA website, and state and territory websites. The initial site will also provide information to industry, recreational users and members of the public interested or concerned about drone policies and regulation, including complaints processes.

The portal will further serve as a coordinated portal of information regarding regulatory processes, procedures, government support programs and other relevant information to support operational and investment decisions by industry.

To support industry operations and approvals, DITRDC will also work with industry and other government agencies to develop options to improve the availability of data required for operational risk assessments.

Appendix – Action Plan

Above: A Telstra drone pilot conducting trials for cellular coverage at altitude, carrying a small cell for localised wi-fi access in low to no coverage areas. Image courtesy of Telstra.

Appendix 1 – Aviation Safety Regulatory Road Map

The aviation safety regulatory road map will be designed to ensure that future approaches to safety regulation:

- continue to ensure acceptable levels of safety performance for all operations;
- consider cost burden for operators;
- streamline administrative processes to minimise the time expended to process applications and support the growing scale of operations requiring approval (including through automation where appropriate);
- support innovation by industry and not impose unreasonable barriers to market entry;
- provide clarity to operators about the requirements, evidence and processes that are used to assess regulatory applications;
- embed regular review mechanisms to monitor the advances and assurance in technology performance characteristics, including the increasing use of automation;
- recognises Australian innovation, contribution and knowledge;
- harmonise with international standards where appropriate and practicable, whilst ensuring regulations remain appropriate for Australian conditions, Australian use cases and are consistent with Australia's national interest; and
- consider other regulations, systems and processes as part of a whole-of-government approach to the management of emerging aviation technologies.

The development of the aviation safety regulatory road map will consider:

- regulation of emerging aviation technologies remains outcomes based;
- development and publication of standard scenarios for major use cases of emerging aviation technologies;
- modular approaches to training and licensing requirements to ensure that required qualifications, such as for pilots and technical professionals for drones and larger eVTOL vehicles, are relevant and proportionate to the operations being undertaken;
- requirements for testing and trials of new technologies to support transition to full commercial service, including for testing by remote operation and various levels of automation;
- bespoke processes for assessment of applications related to emergencies, disaster relief, security or other high priority operations;
- fit-for-purpose operational categories for regional and remote drone operations, including BVLoS and autonomous operations, to support agriculture, mining, construction, goods delivery and regional air mobility for passengers;
- certification pathways and airworthiness standards for new aircraft and support systems; and
- adoption of international standards where appropriate.

The aviation safety regulatory road map will be subject to regular reviews and updates to ensure it remains current, achievable and relevant.

CASA RPAS Inspector checking a Yamaha RMAX remotely piloted aircraft. Image courtesy of the Civil Aviation Safety Authority.

Appendix 2 – UTM Action Plan

Government Roles and Responsibilities

DITRDC

DITRDC will continue to lead, coordinate the ongoing development and oversee the governance and policy objectives of a whole-of-government UTM ecosystem. This will include leading consultation processes across government and industry on the development of policy objectives of system design and market operation.

Airservices Australia

Airservices Australia will be responsible for the development, deployment and management of FIMS, consistent with government policies and regulations. The delivery of UTM services will necessitate amending legislation and approvals issued to Airservices. The Australian Government will review the *Air Services Act 1995* and the *Civil Aviation Act 1988* to ensure they are appropriate to enable UTM to meet the Australian Government's policy objectives, enable effective safety regulatory oversight by CASA, and enable Airservices to continue to provide services for the safety, regularity and efficiency of air navigation.

CASA

Within the context of the development and management of the UTM ecosystem, CASA's role as the independent aviation safety regulator will continue to have an important and evolving application to ensure the primacy of safety through continued regulatory oversight of the ATM system and the evolving UTM ecosystem.

CASA will continue to work closely with Airservices and future UTM Service Suppliers (USS) to ensure the development and deployment of the UTM ecosystem and FIMS occurs consistent with the appropriate safety standards to meet government policy objectives. CASA will continue to work closely with other government agencies and regulators that have responsibility for other requirements of the UTM ecosystem, such as security, policy, governance, market regulation, noise, privacy and competition to ensure consistency of applicable legal requirements.

CASA's RPAS digital platform will continue to deliver those services under the responsibility of CASA. The RPAS digital platform will be used in the interim to trial certain services in collaboration with Airservices, such as automated airspace approvals within three nautical miles of a controlled aerodrome. The RPAS digital platform will enable these automated airspace approvals as an interim measure until the FIMS can support this capability, which will be an inclusion in its initial deployment. To avoid duplication, the RPAS platform will cease providing particular services once they are deployed within the FIMS.

In the development of the AFAF, the following matters impacting the airspace safety case of the UTM ecosystem will be considered:

- the safety case for the apportionment and balance of responsibility to meet safety objectives and accountabilities regarding the provision of UTM services;
- the safety impact as the UTM system scales;
- the spectrum of safety mitigations ranging from the application of a common system-wide safety layer through to the adherence to individual safety cases; and
- the benefits and risks associated with the use of contractual relationships compared to regulatory requirements to manage the apportionment of safety responsibilities with the UTM ecosystem.

A V-TOL RPAS operator monitors the progression of his flight via their Ground Control System as they work through a tricky procedural separation procedure from another UAV being flown VLOS. Image courtesy of Dr Terry Martin.

UTM certification

A coordinated and holistic whole-of-government approach among relevant Government agencies and regulators will be required for approvals and relevant certifications for USSs, supplemental data service suppliers and other UTM actors. This is due to the wide range of applicable requirements, which span matters including safety, security, data privacy, competition, consumer and corporations law. The NEAT Consultative Committee will provide industry advice to government agencies and regulators to support the coordinated development of certification and/or approval requirements. The approach to UTM certification/approvals will be:

- proportionate and appropriate to the safety and security criticality of services or data being provided;
- reflective of the relevant short-term and long-term requirements to enable the participation by UTM actors;
- outcomes and performance based; and
- coordinated and consistent having regard to all Australian legal requirements applied by Government agencies and regulators, such as safety, market access, data storage and access, privacy, security, competition, consumer and corporations laws.

Government oversight and assurance of UTM services

An effective airspace management system for low altitude operations at scale needs to balance an array of operational, technical, commercial and community objectives. It also requires safeguards to mitigate safety and security risks, and prevent anti-competitive behaviour and privacy breaches. Achieving this balance will require the development of a design intent for the UTM ecosystem and the FIMS that meet Australia's needs, informed by a critical review of architectural options.

The Australian Government will make informed decisions to achieve an appropriate balance following the provision of informed advice from DITRDC, derived after consultation with CASA, Airservices, other Government agencies, regulators, service providers and industry. The scope of deliberations will span the means to achieve Government policy objectives, ensure safety, security and system integrity right through to the minimisation of undesirable conduct and anti-competitive behaviour.

Oversight and assurance will also play a key role in optimising this balance, with the necessary measures tailored on a case-by-case basis for each service and function. Allocation may be constrained to Government control to appropriately mitigate risks or to meet legislative requirements, such as safety obligations, or where there in an onus on government to support fair market principles. For many other functions, appropriate levels of government oversight will allow industry to provide functions and services with varying degrees of monitoring, auditing and general assurance. The following three broad categories will guide the determination of oversight and assurance measures:

* It is also recognised that for some services, cost efficiency may be achieved more effectively by industry.

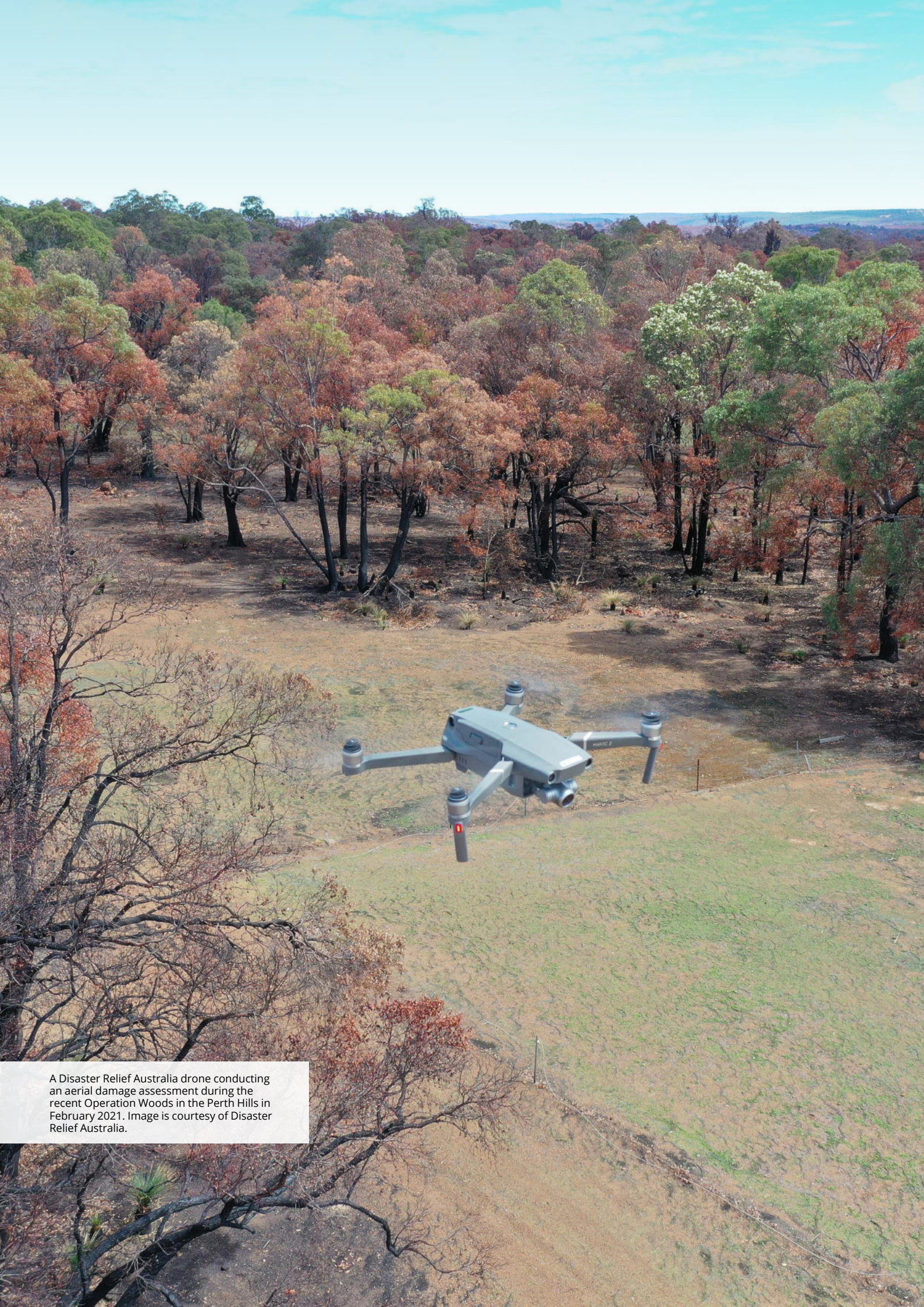
UTM Action Plan

The UTM Action Plan for the development and deployment of UTM will be consistent with the UTM Guiding Principles, AFAF and the broader approach outlined in the National Emerging Aviation Technologies Policy and include:

- advice to support the Australian Government to make decisions regarding UTM system architecture;
- an Implementation Plan for the UTM ecosystem and FIMS; and
- a minimum viable product (MVP) for the initial deployment of UTM consistent with the needs of users to comply with lawful requirements and to support the appropriate mitigation of relevant risks and impacts;
- an appropriate and sustainable cost model for UTM that:
  - enables flexibility in service delivery and user needs;
  - incentivises industry investment in the sector;
  - promotes value through the span of the operational chain; and
  - consistent with the whole-of-government approach to fees and charges.
- a detailed UTM services and data schedule for the MVP that:
  - defines performance expectations and minimum service levels, including customer service levels;
  - enables the non-discriminatory provision of data required for compliance with all lawful and operational requirements;
  - supports all users to strategically and tactically deconflict operations;
  - identifies the circumstances where the provision of time critical data supersedes the need for privacy of business intelligence, and the effectiveness of architectural choices in maintaining the primacy of safety;
  - supports time criticality of the provision of data where necessary and appropriate;
  - complies with data privacy requirements; and
  - minimises the possibility of single gatekeepers in the provision of data distribution where unwarranted.
- detail regarding the appropriate and proportionate assurance and oversight measures for UTM services and data;
- measures to enable relevant UTM services to be accessible by users in regional and remote areas of Australia;
- an operational testing program to support and inform UTM deployment, which should occur in regional areas of Australia where appropriate and feasible; and
- additional criteria and thresholds to support ongoing deployment of additional UTM services to enable future development and advances in user needs, technology and performance, including relevant UTM services for AAM operations when required.

The Action Plan will be developed in a manner to ensure:

- appropriate measures (policy, governance, technical) are included to circumvent inappropriate technology lock-in and allow the addition of capabilities over time, without detriment to the ecosystem;
- the scope of UTM is regularly assessed to ensure capitalisation on opportunities to advance safety, efficiency and security for all airspace users;
- coordination and consistency across all lawful requirements for all UTM services and data,
- regard for instances where privacy may limit sharing of some data, but not at the expense of critical system efficiency and functionality;
- lessons and learnings, including validations from trials, can be incorporated into ongoing design and deployment where appropriate;
- timely development of informed advice regarding any need for technology lock-in, deferred decisions and any implications;
- architectural, UTM service and data choices will adequately support the continued efficiency and competitiveness of the system as it scales into the future;
- system flexibility to enable tailoring of services to accommodate the range of different and evolving requirements; and
- consistency with the broader approach to airspace administration and management.



A Disaster Relief Australia drone conducting an aerial damage assessment during the recent Operation Woods in the Perth Hills in February 2021. Image is courtesy of Disaster Relief Australia.