# Northern Territory Drone Industry Strategy

## Draft

NORTHERN TERRITORY GOVERNMENT

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# Introduction

The drone industry has experienced significant growth over recent years with the global market, representing the revenue from drone sales, components and related services, estimated to be worth US$30.6 billion in 2022[1]. The Territory Economic Reconstruction Commission's (TERC) Final Report identifies drones as one of the emerging digital technologies that will play a critical role in achieving the government's vision of a $40 billion economy by 2030[2]. A mature drone industry will result in increased productivity and economic participation across all sectors and presents significant opportunities, particularly for those in regional and remote regions of the Territory.

The Northern Territory (NT) drone ecosystem is still in its infancy but with vast, open landscapes, extreme climatic conditions, proximity to growth markets and strong research capabilities, the Territory is well positioned to become a leader in the industry. Demand for drones is set to rapidly increase as the technology becomes more advanced, accessible and cost effective. Increased uptake of drones has the potential to enhance productivity and safety across many of the Territory's key sectors such as mining, agriculture, natural resource management and tourism.

The NT Drone Industry Strategy ('the Strategy') has been developed in collaboration with industry stakeholders to provide strategic direction for the NT drone industry. It is designed to capitalise on the potential of drones to stimulate economic growth, foster innovation, attract investment and create jobs. The Strategy aims to position the Territory at the forefront of the industry by leveraging its unique advantages to grow the size, capability and sustainability of the sector.



[1] Drone Industry Insights, *Drone Market Report 2023-2030*, 2023
[2] Territory Economic Reconstruction Commission, *Territory Economic Reconstruction Commission Final Report*, 2020

# Strategy at a glance

## VISION

To drive the development and application of drone technologies to enhance traditional industries, deliver economic benefits and transform service delivery.

## FOCUS AREAS

### INDUSTRY GROWTH

Work with industry to sustainably grow the NT drone industry. Key outcomes include:

- Attracting new drone industry investment and R&D activity
- Increased uptake of drone technology by traditional industries
- Facilitating new use cases and demonstrator programs for drone tech
- Developing strategic infrastructure to support the drone industry

### EDUCATION, TRAINING & WORKFORCE DEVELOPMENT

Work with research and educational organisations to develop the skilled workforce required for the NT drone industry. Key outcomes include:

- Increased use of drones in STEM education
- Fostering partnerships between industry and education institutions to bridge the gap between education and employment
- Establishing training pathways that support people to pursue a career in drones

### REGULATION & GOVERNMENT SETTINGS

Work with all levels of government to establish a regulatory environment that enables drone industry growth. Key outcomes include:

- Contributing to the national agenda through law and policy development/ reform to create a consistent framework for drone operations
- Implementing NTG policy settings that support the compliant use of drones within government

### COMMUNITY & RECREATION

Work with the public to increase awareness of and recreational use of drones. Key outcomes include:

- Increased public awareness and education regarding drone rules and uses
- Increased uptake of recreational drone users through drone racing and E-sports
- Establishing facilities for recreational drone users

## Why we are implementing the Strategy

A mature drone industry will result in increased productivity and economic participation across all sectors and presents significant opportunities, particularly for regional and remote regions of the Territory.

# Economic and strategic context

## Global

The drone industry has experienced significant growth over recent years with the global market estimated to be worth US$30.6 billion in 2022[3]. This growth trajectory is expected to continue, with the overall drone market forecast to grow by an average of 8.3% each year, until 2030 when the market is expected to be worth US$55.8 billion[4].

The Asia-Pacific market is the fastest growing region in the world and is predicted to grow at a rate of 12.1% per year between 2023 and 2030.[5] This is largely due to changes in policy and regulation that support the use of drone technology in the region as well as the increasing momentum of China's drone industry and manufacturing capability, advanced electronics markets and a significant increase in demand for drones across developing nations in Southeast Asia[6].

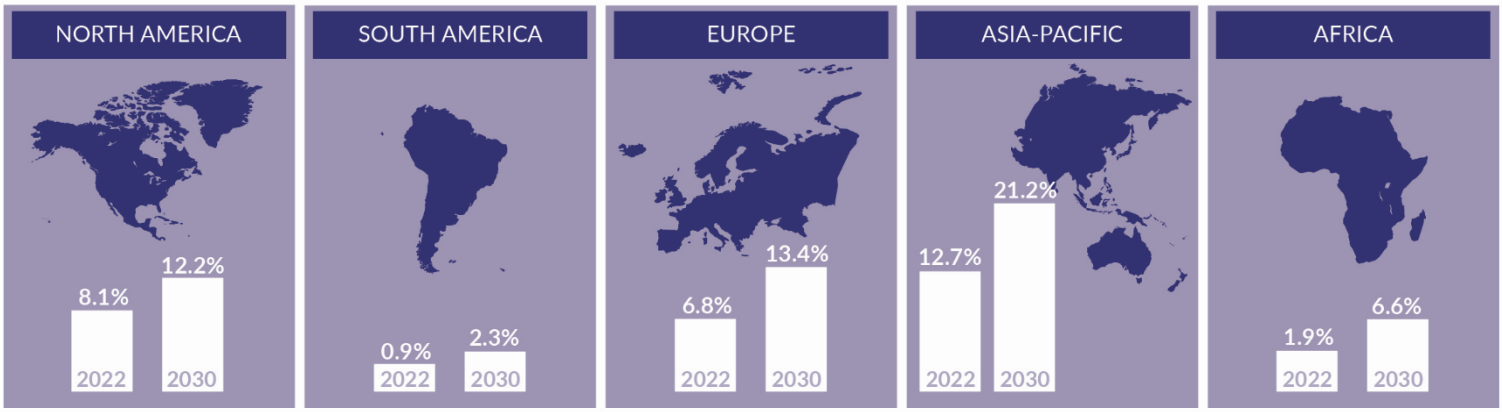


*Figure 1- Drone market growth by region- 2022 CAGR% and predicted 2030 CAGR% (Source: Drone Industry Insights 2023)*

As new companies enter the market and contend for market share, the drone industry will become more competitive which is likely to drive growth and innovation, reduce costs and develop a pipeline of skilled professionals. The drone industry will also benefit from technology advancements and skill development in aligned industries such as information technology, cyber security and engineering.

Despite the predicted growth of the industry, it must also be prepared to withstand disruption and adapt to global trends that may impact the sector. Geopolitical volatility has led many countries to increase investment into military drone capabilities for surveillance, border security, counterterrorism operations and combat support[7]. Many countries have also introduced regulations and restrictions to mitigate the risk of drones being used for malicious purposes. The industry must be prepared for the impact that such restrictions could have on the global supply chain, particularly for imports and exports.

Issues surrounding cyber security, surveillance and data privacy are becoming increasingly important with many governments considering how they will manage these risks. In 2022, the United States (US) Government banned the use of global market leader, Chinese company, DJI products in almost all government drone programs[8]. DJI is the biggest supplier in the civilian drone industry and currently supplies approximately 70% of global drones[9]. With so many organisations relying on DJI products to

[3] Drone Industry Insights, *Drone Market Report 2023-2030*, 2023
[4] Drone Industry Insights, *Drone Market Report 2023-2030*, 2023
[5] Research and Markets, *Asia Pacific Drones Market: Market Size, Forecast, Insights, and Competitive Landscape*, 2023
[6] Grand View Research, *Consumer Drone Market Size, Share & Trends Analysis Report*, 2021
[7] Fact.MR *Drones Market Analysis- Global Market Insights 2022-2032*, 2021
[8] Kuo, A, *Pentagon blacklists Chinese Drone Maker DJI*, The Diplomat, 2022
[9] Greenwood, F, *There's no Substitute for Chinese Drones,* Foreign Policy, 2023

provide high quality and cost-effective drone solutions, the implications of such restrictions must be carefully considered[10].

The Australian Government is actively reviewing the risks associated with the use of foreign drones in relation to cyber security, surveillance and national security, with an audit of the Australian defence supply chain ordered in 2023 to identify high risk technologies[11]. The Australian Department of Defence also released a tender in 2023 seeking information to support an *'Australian sovereign uncrewed aerial system and trusted autonomy industrial capability'* to increase local capability and lessen Australia's reliance on foreign-made drones and decrease risks associated with cyber security, surveillance and large-scale foreign interference[12].

## National

The uptake of drone technology over the next few years could play a critical role in boosting the Australian economy. Under a medium uptake scenario, the drone industry is projected to increase Australia's Gross Domestic Product (GDP) by $14.5 billion, create more than 5000 jobs and contribute $1.8 billion to the Australian economy by 2040[13]. It also has the potential to save $9.3 billion through cost savings and productivity benefits across all sectors until 2040[14].

The Australian Government Department of Industry, Science and Resources has listed emerging aviation technologies, including drones, on its 'List of Critical Technologies in the National Interest,' which means they are considered to be critical for the nation's economic success, security and social cohesion either now or over the next decade[15]. This signals that the development of the drone industry is likely to be prioritised and supported by government.

The Australian drone industry has demonstrated its ability to innovate and collaborate to progress drone technology and support industry growth. Through a culture of safety and accountability, Australia has established itself as a trusted location and partner for drone activities. Large scale adoption will depend largely on the speed and scale that drone technologies are developed and the ability to demonstrate successful applications to end-users[16]. A strong local drone industry and supply chain will not only enhance productivity and safety across key sectors but will also support Australia's national security agenda and sovereign capability goals.

The Civil Aviation Safety Authority (CASA) regulates drone operations in Australia and has implemented a regulatory framework to support the safe and sustainable development of the sector. CASA's approach is designed to enhance safety and accountability whilst also enabling commercial operations and testing of drone technology[17].

From an industry perspective, navigating the regulatory framework can require substantial time and financial investments which can deter or prohibit businesses from entering the market. The complex process for obtaining approvals for operations such as beyond-visual-line-of-site (BVLOS) flights is delaying technological advancements and development of applications to support key sectors.

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[10] Evans, J, *DJI drones used widely across government departments despite Border Force bans*, ABC, 2023
[11] Whinnett, E, *Call for audit as Chinese DJI drones join ADF war games,* The Australian, 2023
[12] Dougherty, R, *Defence calls for sovereign unmanned aerial system,* Australian Aviation, 2023
[13] Deloitte Access Economics, *Economic Benefit Analysis of Drones in Australia*, 2020
[14] Deloitte Access Economics, *Economic Benefit Analysis of Drones in Australia*, 2020
[15] Department of Infrastructure, Transport, Regional Development, Communication and the Arts, *Aviation Green Paper – Towards 2050*, 2023
[16] iMove CRC, *Validating the benefits of increased drone uptake for Australia*, 2023
[17] Department of Infrastructure, Transport, Regional Development, Communication and the Arts, *National Emerging Aviation Technologies Policy Statement,* 2021

These challenges are well understood and are being addressed through the following initiatives led by CASA and the Australian Government Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA)[18].

| CASA | |
|---|---|
| **Initiative** | **Description** |
| Trial of digital airspace authorisations | Enables Remotely Piloted Aircraft Operator's Certificate (ReOC) holders to apply online to receive near real time automatic authorisation to fly within 5.5km of a controlled airport. |
| Remotely Piloted Aircraft System (RPAS) Digital Platform | Provides a central source of trusted data that software developers can integrate into third-party mobile and web-based apps |
| Drone Safety Advocates | CASA-recognised retailers, wholesalers and manufacturers who pledge to educate customers about when, where, and how customers can use their drones safely. |
| Drone safety signage | Standardised national drone safety signage to help people know where they can and cannot fly drones. |
| Development of the RPAS and Advanced Air Mobility (AAM) Strategic Regulatory Roadmap | Sets a long-term plan for safely integrating RPAS and AAM technologies into Australia's airspace and future regulatory system, alongside traditional aviation. |
| Development of standard scenarios | To identify safety risks and establish mitigations to ease the burden on industry from having to develop bespoke procedures |
| Guidance material | To assist industry to understand its safety obligations and streamline the application process |
| **Department of Infrastructure, Transport, Regional Development, Communications and the Arts** | |
| **Initiative** | **Description** |
| National Drone Detection Network | A scalable network of sensors across Australia to provide timely and accurate information to users |
| Remote identification | Public consultation is underway as a first step towards a potential mandate for drones to carry Remote ID to provide information about who is operating a drone and where. |
| Drone Rule Management System | A staged implementation of an Information and Communication Technology (ICT) platform which will manage drone rules relating to noise, privacy, security, environmental impacts and cultural sites. |
| Infrastructure Planning Framework | Will provide guidance for planning authorities to support the integration of drones and electric vehicle take–off and landing (eVTOL) vehicles in the community and broader transport networks. |
| Best practice procurement guidelines | Guidelines to support the consideration of emerging aviation technologies within government procurement processes to support a strong local industry. |
| Uncrewed Traffic Management System | To support the safe, economical and efficient management of uncrewed aerial systems in Australian airspace. |
| Aviation White Paper | Will establish the long-term policies to guide growth and innovation in the aviation sector, including emerging aviation technologies such as drones. |

*Table 1- DITRDCA drone related initiatives*

[18] Australian Government Civil Aviation Safety Authority, *Industry Initiatives*, 2023

## Northern Territory

The number of ReOC holders in the Territory has increased by 50% since 2022, demonstrating a significant expansion in the capability of local drone service providers[19]. In 2023, there were 684 Remote Pilot licence (RePL) holders and 1120 registered drones in the Territory[20]. The NT's small population and vast geographical size equates to 1950 square kilometres per licenced remote pilot, giving the Territory the lowest drone density in the country[21]. The Territory is also leading the way in terms of gender diversity with 16.7% of NT RePL holders identifying as female compared to 10% nationally.

Many of the existing drone use cases across Australia and internationally are demonstrating potential applications that align with the major industries in the Territory including mining, defence, construction, agriculture, emergency management, natural resource management and health.

The Territory has significant R&D capabilities with Charles Darwin University's (CDU) North Australia Centre for Autonomous Systems (NACAS). The NACAS conducts industry-focused research into the application of autonomous systems in northern Australia and the Asia Pacific region. The centre's strategic location and expertise will support CDU to maintain leadership in the autonomous systems sector.

In addition, the NT Government is supporting the local drone industry through the establishment of the Northern Territory Drone Industry Network. The Network is comprised of industry, academia, government, and members of the community with a shared interest in developing and leading a vibrant and strong drone ecosystem in the Territory.[22]

## Opportunities for regional and remote communities

Approximately 40% of the Territory's population resides in remote or very remote areas compared to 2% of the national population[23]. People living in remote NT communities face challenges related to healthcare, infrastructure and services due to their isolated location. Drones have the potential to deliver significant economic and employment opportunities, as well as improved service provision which could lead to reductions in isolation and inequality gaps across geographic regions[24]. Significant developments in technology such as BVLOS as well as increased human resource capability will be required to scale drone services to become financially viable and increase uptake across the regions.

Given its rich Aboriginal heritage, the Territory has an opportunity to play a leading role in the development of culturally appropriate use of drone technology and regulatory requirements. Work in this area has already begun with a First Nations-led project focussing on drone use guided by Traditional Owners in Kakadu National Park. The project developed protocols for the responsible and ethical use of drone technology on Aboriginal owned and managed land[25].

Further developments in this space will likely see updates to permit systems, agreements, and guidelines to support culturally appropriate use of drones on Aboriginal land. Such activities will require extensive consultation with Land Councils, Traditional Owners, Aboriginal organisations and communities to increase uptake of the technology and encourage local industry participation.



[19] CASA, Remotely Piloted Aircraft Operator's Certificate (ReOC) holders, 2023
[20] CASA, 2023
[21] Geoscience Australia, Area of Australia, 2023
[22] Northern Territory Government, *The NT Drone Industry Network and Committee*
[23] Australian Bureau of Statistics, Regional Population Release 2021-2022
[24] iMove CRC, *Validating the benefits of increased drone uptake for Australia*, 2023
[25] National Environmental Science Program, *First Nations-led protocols guiding responsible drone use*, 2021

Aboriginal ranger groups across the NT are also beginning to introduce drone technology to support land and sea management activities. Several projects have been funded under the NT Government's Aboriginal Ranger Grants Program to map and monitor invasive species as well as seagrass and nesting sea turtles[26].

Drones are likely to enhance the capabilities of ranger groups in regional and remote communities and offer additional benefits across important sectors such as agriculture, resources and tourism. As drone use increases in the Territory, there are likely to be opportunities for regional communities to provide repair and maintenance services, which, if performed locally, would boost regional economies and reduce costs and inefficiencies.

**CASE STUDY: Bibi Planes for Health**

Access to public health services and supplies is a significant problem in remote areas of the Territory. The Bibi Planes for Health project, currently running in West Arnhem, is a partnership between the iMOVE Cooperative Research Centre (CRC), NT Department of Health, Charles Darwin University and Red Lily Aboriginal Corporation. The project aims to explore and solve the logistical, technological, and regulatory challenges of incorporating drones into the supply chain of health care for remote communities in the NT.

The delivery of time-critical medical items is a serious limitation and cost for healthcare in remote and regional Australia. Bibi planes have the potential to reduce the time and cost associated with medical delivery and save lives in remote and regional communities.

*"Flying to remote NT communities is tough due to harsh operating conditions. Using our flight testing area, we're finding solutions to safely and reliably use drones for medical deliveries by overcoming technical challenges."* (Rebecca Ludgate, NACAS Chief Remote Pilot)

*"Ensuring consistent ground-to-drone communications in regions with isolated infrastructure significantly contributes to these challenges. Once overcome, implementing medical delivery drones have the potential to transform the lives of isolated communities, providing timely healthcare and connecting remote areas through improved logistics. Economically, a 25kg delivery drone is far safer than a road transport and when the range challenges are overcome far more efficient than a 757kg Cessna aircraft."* (Matthew Worrad, NACAS Research Operations Officer)

[26] Northern Territory Government, *Aboriginal Ranger Grants Program*, 2023

**CASE STUDY: Wintjiri Wiru**

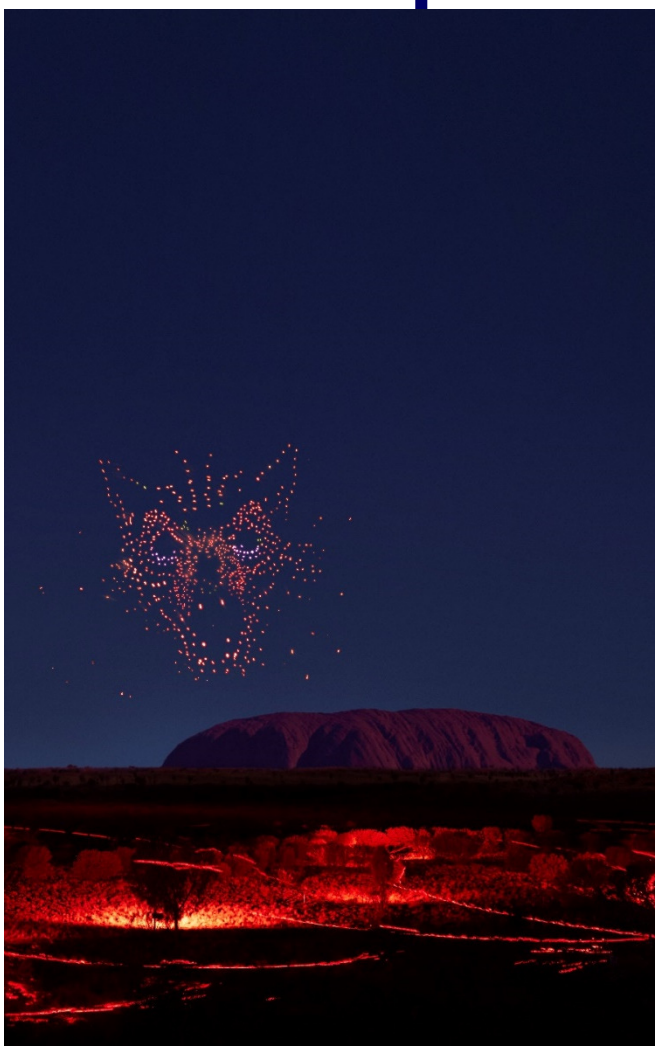
Wintjiri Wiru, which means 'beautiful view out to the horizon' in the local Pitjantjatjara language, is the largest permanent drone show in the world. With over 1000 drones, lasers and light projections, the show tells the ancient Mala story of the Anangu people. The show is a culturally significant storytelling experience, developed in close consultation with the Wintjiri Wiru Working Group comprised of senior Anangu from Kaltukatjara and Mutitjulu. With Uluru as its backdrop, the show is narrated in Pitjantjatjara and Yankunytjatjara languages and accompanied by a traditional soundtrack created by members of the Anangu community.

Visitors are transported to a sustainably built amphitheatre to experience the immersive experience, told in light, above the ground. The drones, weighing 310 grams each can fly three metres per second and reach up to 100 metres in height during the show. The drones are launched from and returned to specially designed boxes which cool and charge the drones and protect them from the harsh conditions of Central Australia.

Wintjiri Wiru is a ground-breaking show, which demonstrates the potential of drone technology for cultural tourism experiences. The show has provided significant economic benefits and job opportunities for the Yulara community and the Territory more broadly.

*"When you choreograph over 1,000 drones to tell a story that's been told in the sand for more than 60,000 years and will now be told using cutting-edge technology for the world to see, it is important to honour the culture in every step of the process."*

*"We are honoured we can share the cultural importance of the Mala story with our guests, through such an illuminating and captivating experience in the spiritual heart of Australia. As custodians of the land and part of the Mala story, the Anangu consultation group has carefully guided us on the Wintjiri Wiru experience, from conception to launch, to generously share their story with the world." (Matt Cameron- Smith- CEO, Voyages Indigenous Tourism Australia)*



*Source: Voyages Indigenous Tourism Australia*

*As custodians of the land, Anangu hold the Mala story from Kaltukatjara to Uluru. To share their story, RAMUS designed and produced an artistic platform using drones, light and sound to create an immersive storytelling experience.*

# Industry overview

## Defining drones

For the purpose of this strategy, drone refers to any Unmanned Aerial Vehicles (UAV), Remotely Piloted Aircraft (RPA) or Electric Vertical Take-off and Landing Vehicle (eVTOL).

The use of remotely operated and autonomous sub-surface and surface marine vessels is steadily increasing and while this emerging technology offers potential for the Territory, it sits beyond the scope of this strategy.

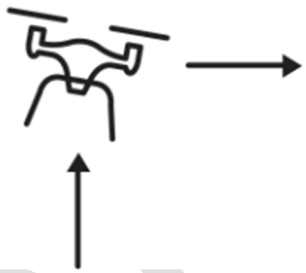
Drones can be classified into the categories and sizes outlined in Figure 2[27]:

| Size | Weight |
|---|---|
| Micro | <250g |
| Very small | 250g – 2kg |
| Small | 2-25kg |
| Medium | 25-150kg |
| Large | >150kg |

**Multi-rotor helicopter**

>1 power-driven engine (rotor) that rotates or turns vertically

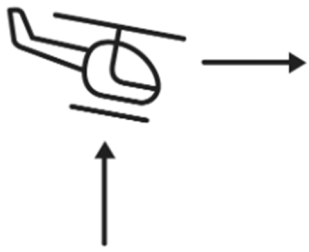
Takes off, lands, flies and hovers like a traditional 'single rotor' helicopter but has >1 rotor



**Single-rotor helicopter**

1 power driven engine (rotor) and looks like a traditional helicopter

Usually has another rotor on the tail/end of aircraft



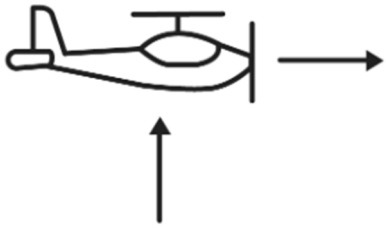
**Aeroplane**

Looks and flies like a regular plane with fixed wings

Takes off and lands horizontally and usually cannot hover

**Powered-lift**

Can take off and land vertically like a helicopter but can then move into forward flight like a traditional plane



**Airship**

Engine powered and is 'lighter than air'

Can be filled with a buoyant gas and usually floats in the air

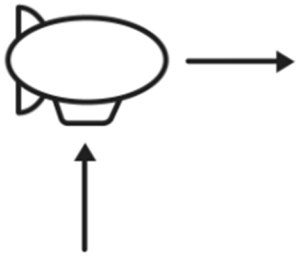


*Figure 2- Drone categories and sizes*

[27] Australian Government Civil Aviation Safety Authority, *Types of drones*, 2023

## The drone ecosystem

The drone ecosystem refers to the organisations involved in the research, development, manufacturing, deployment, operation, regulation and use of drones. In 2022, Australia's drone ecosystem included hardware, software, applications, services and regulations and was comprised of more than 140 drone related organisations classified across the following domains: [28]

- Industry bodies
- Service providers
- Training providers
- Insurance providers
- Research and technology
- Manufacturing
- Payloads and software
- Drone racing
- Government organisations

The Territory has a growing drone ecosystem comprised of:

- Commercial operators
- Recreational operators
- Training providers
- Research institutions
- End-users of drone technology/data

Regulation and governance of the drone industry is coordinated by CASA, DITRDCA, state, territory and local governments and Land Councils. The roles of each of these entities is outlined in Figure 3.

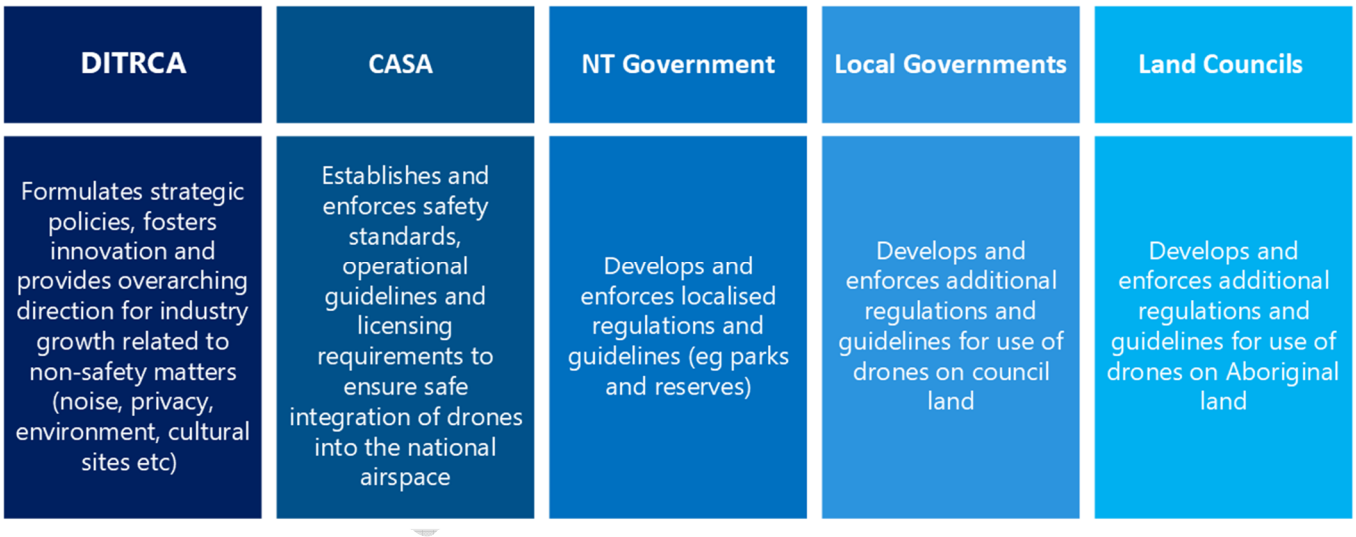



*Figure 3- Drone industry governing bodies*

The NT Government has implemented several key initiatives (Figure 4) to support the national agenda, ensure compliant use of drones within government and grow the local industry. The NT Government will continue to work with national and Territory stakeholders to ensure a coordinated approach to industry development.

[28] Mirragin, *Australian Drone Ecosystem, 2023*

| NT Drone Industry Network | Nt Drone Industry Network Committee | NTG RPA Policy | NTG Interagency Drones Working Group | NT Drone Industry Strategy |
|---|---|---|---|---|
| A collaborative group of businesses, industry, academia, government and civilians with a shared interest in developing a strong local drone industry | Identifies and drives business, research, training and innovation opportunities to benefit and grow the NT drone industry | Provides direction to all NTG agencies on the governance and safe use of RPAs for NTG business and service delivery | A forum for information sharing across NTG agencies to identify, mitigate and expedite and issues pertaining to drone use withing NTG | Provides strategic direction to capitalise on the opportunities presented by the drone industry in the NT |

*Figure 4- NT Government drone industry initiatives*

## The drone value chain

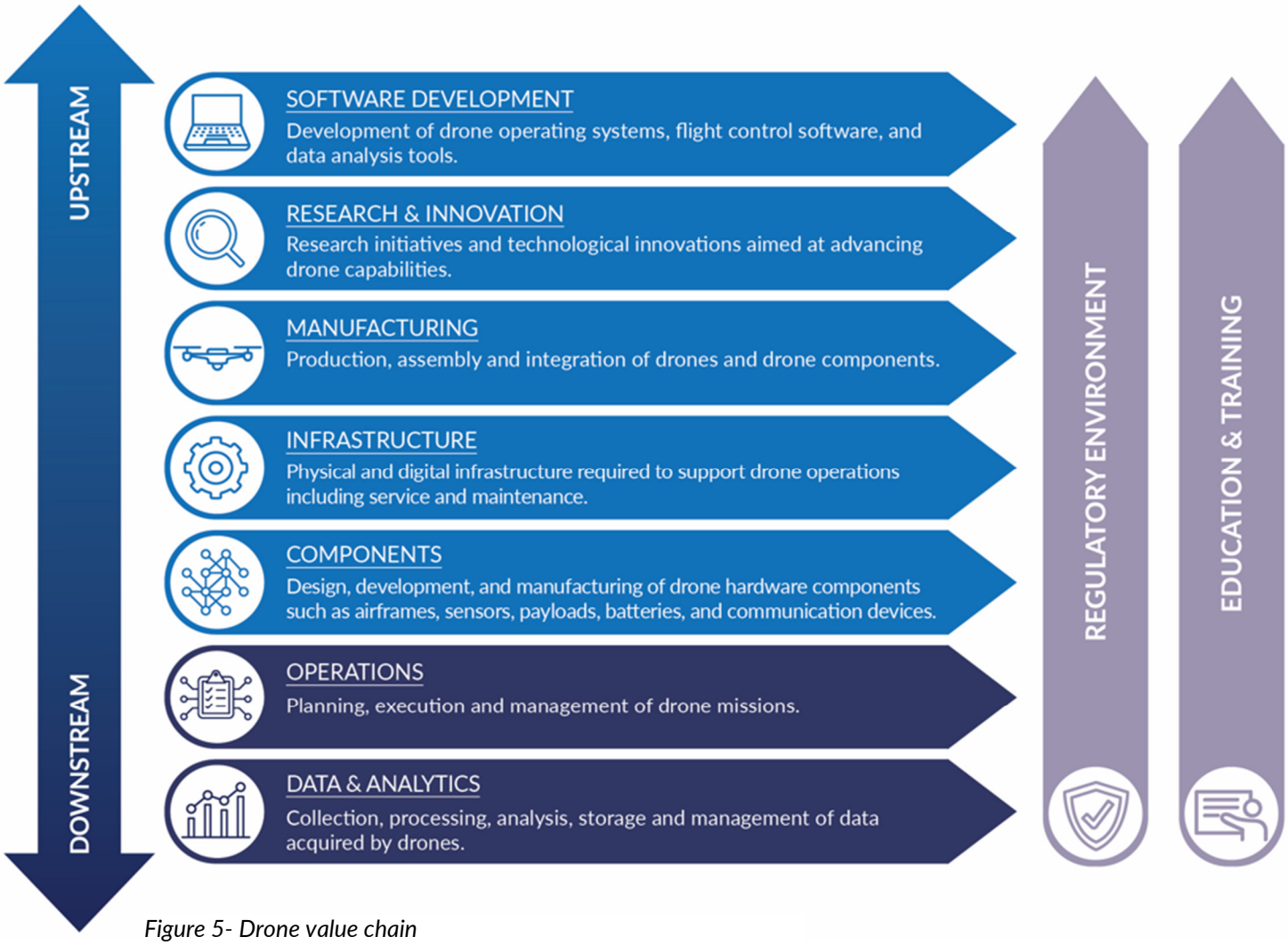



*Figure 5- Drone value chain*

## An enabler of traditional industries

Drones are an enabling technology that have the potential to transform the Territory's priority sectors. They offer efficient, safe and low-cost solutions for traditional industries and can also support emerging industries such as space and the circular economy which are starting to play an increasingly important role in the growing and diversifying the Territory's economy.

Table 2 outlines the results of a literature review examining the applications, uptake and projected addressable market value for drones and associated services in Australia across sectors by 2040[29]. The sectors included in the review were identified as the most likely to have impact in the Australian market.

| Sector | Potential application | Current market penetration | Current uptake in Australia vs internationally | Projected addressable market value |
|---|---|---|---|---|
| Environment management | Conservation and sustainability<br>Wildlife management<br>Water resource management<br>Environmental impact assessment | Medium | Matching | No data available |
| Public services | Emergency response (fire, ambulance, search and rescue)<br>Border patrol<br>Local law enforcement<br>Disaster management | Medium | Matching | $1.3 billion by 2040 |
| Agriculture | Crop or livestock monitoring/mapping<br>Crop spraying<br>Crop planting<br>Forestry and fishing<br>Soil analysis<br>Irrigation management | High | Leading | $1 billion by 2040 |
| Mining and resources | Stockpile measurement/geotechnical modelling<br>Blast and mine reclamation monitoring<br>Equipment inspection<br>Surveying/mapping | High | Matching | $202 million by 2040 |
| Construction | Inspections<br>Surveying<br>Safety assessments | High | Lagging | $1.5 billion by 2040 |
| Recreation and entertainment | Drone racing<br>Archaeological monitoring<br>Conservation<br>Aerial video/photography | High | Matching | $891 million by 2040 |
| Advanced Air Mobility | Taxis<br>Point-to-point services<br>Regional air mobility | Low | Lagging | $593 million by 2040 |
| Freight & last-mile deliveries | Express parcels<br>Food deliveries | Low | Lagging | $575 million by 2040 |

[29] iMove CRC, *Validating the benefits of increased drone uptake for Australia*, 2023

| | | | | |
|---|---|---|---|---|
| | Pharmaceutical/medical deliveries<br>Regional and remote pathology<br>Cargo-airfreight | | | |
| Defence and national security | Surveillance and reconnaissance<br>Border patrol<br>Search and rescue<br>Attack operations<br>Electronic warfare | Out of scope of civilian/commercial report | | $2.9 billion |
| Maritime | Search and rescue<br>Mapping and surveying<br>Inspections<br>Maritime surveillance | Included in logistics | | |
| Manufacturing | Delivery<br>Inventory management<br>Quality control | Lack of data due to low penetration and limited market size in Australia | | |
| Health | Delivery of medical supplies<br>Public health monitoring | Included in e-commerce/logistics | | |

*Table 2- applications, uptake and growth of drones in other sectors*[30]

Australia's current drone ecosystem is largely commercially focussed, however drone capability for defence and national security purposes is expected to increase significantly over the coming years. The recent Defence Strategic Review highlights the strategic importance of northern Australia and the need for ongoing investment in military infrastructure and assets across the Top End. Drones will form part of this capability uplift with the Australian Defence Force expected to spend $20 billion on drone programs over the next 10-15 years[31].

Defence is partnering with the United States Navy to procure four MQ-4C Triton Unmanned Aircraft Systems. The Triton aircraft will be based at the Royal Australian Air Force (RAAF) Base Tindal and remotely operated from RAAF Base Edinburgh. These aircraft can support long range missions of more than 24 hours and cover more than one million square nautical miles. The Tritons will support intelligence, surveillance and reconnaissance activities, providing a foundational capability and clear growth trajectory[32].

Lockheed Martin and Northrop Grumman will require Australian industry capability throughout the lifecycle of the program thought facilities construction, logistics support, maintenance, training system operation and support, mission planning system support, and component repair. Plans to establish maintenance workforce capability is expected to create at least 40 new jobs in the Territory[33].

[30] iMove CRC, *Validating the benefits of increased drone uptake for Australia*, 2023
[31] Bennett & Co Corporate and Commercial Law, *Drone Industry Update*, 2021
[32] McIlroy T, *Triton drone purchase to boost northern defences*, Australian Financial Review, 2023
[33] McIlroy T, *Triton drone purchase to boost northern defences*, Australian Financial Review, 2023

**CASE STUDY: Rise Project Consulting**

Rise Project Consulting (Rise) is an award-winning Territory business providing large-scale asset inspection and visualisation services using UAV drones, 3D scanning, USV bathymetric drones and underwater ROVs.

Rise are remote Northern Australian specialists with a deep understanding of the unique challenges of working in the remotest parts of the Territory having successfully delivered projects in over 80 remote communities.

*"At Rise, we believe the value of drone technology can only be measured in the context of where it will be used. This is why we invest heavily in researching and testing our equipment to ensure that it can withstand the extremes of the Territory's climate, and that it is robust enough to be transported to the most isolated communities. We also actively seek staff who are acclimatised to the extremes of the north and experienced working in remote Northern Australia." (Anna Goat, Business Director)*

It is this commitment to R&D, and expertise that saw Rise PC successfully undertake 319 UAV drone inspections of the GEMCO accommodation, Groote Eylandt, for South 32 and HK Solutions. This project required extensive logistical planning to ensure the equipment did not overheat; battery and charging management and heat mitigation strategies for the pilots.

The inspections included roof images, external surface images and condition assessments. Rise were able to constantly fly UAV drones up to 10 hours a day, for 10 consecutive days in the tropical heat with no equipment or pilot failure.

## Strengths and opportunities

The Territory drone industry is in its infancy and faces challenges that are typical in emerging industries and for small jurisdictions with limited resources and a low population.

However, the Territory also has a range of comparative advantages that make it uniquely placed to drive growth and innovation in the drone industry. The Strategy aims to build on these advantages to benefit the drone industry and the traditional industries it supports.

| Strategic advantage | Opportunities |
|---|---|
| **Climate & terrain**<br>*The NT is relatively flat with two distinct climate areas- tropical monsoonal in the top end and dry, semi-arid centre with extreme heat and cold.* | Ability to test drone technology in extreme conditions will ensure technology will work in most regions in the world. |
| **Proximity to growth markets**<br>*The NT is ideally situated near Asia Pacific growth markets.* | Strategic gateway to import and export drone-related materials, services and skills. Access to growing Asian markets enables investment attraction and international partnership opportunities. |
| **Large Aboriginal population**<br>*30% of the NT's population are Aboriginal or Torres Strait Islander. The median age of Aboriginal people in the NT is 26 years compared to 35 years for non-Aboriginal people.* | The Territory can play a leading role in the culturally appropriate use of drones on Aboriginal land. Drones can be used to support cultural heritage and preservation efforts through monitoring/ management of sacred sites and land, promotion of Aboriginal culture and tourism opportunities. Drones can also support Aboriginal ranger groups' land and sea management activities, support growth of the carbon farming industry, and support Traditional Owners to care for country.<br><br>Aboriginal service delivery organisations in remote communities can use drones for the delivery of medical, construction and infrastructure maintenance services. Such organisations understand community needs and are trusted by the community to deliver services in a culturally appropriate manner.<br><br>Aboriginal communities have a high working-age demographic and greater likelihood of remaining in the NT, creating a stable and skilled workforce, particularly in regional and remote areas. |
| **Research capabilities**<br>*The NT has world-leading research capabilities through CDU's Northern Australia Centre for Autonomous Systems (NACAS)* | NACAS represents significant expertise in the application of RPAS technologies for various sectors in northern Australia. |
| **Remote and sparsely populated**<br>*40% of the NT population resides in remote or very remote areas* | Drones represent an innovative method to deliver services and supplies to regional and remote communities to reduce inequity between metropolitan and remote populations.<br><br>Lower risk when operating drones in sparsely populated areas with less air traffic and potential to establish drone flight corridors. |
| **Supportive government** | The NT Government recognises the potential of drones to contribute to its economic goals and is proactively implementing policies and initiatives that support the uptake of drone technology and the industry more broadly. |

*Table 3- NT strategic advantages and opportunities*

# Focus areas and strategic actions

The NT Government has identified the following key focus areas to achieve its vision over short, medium and long-term timeframes.

1. Industry growth
2. Education, training and workforce development
3. Regulation and government settings
4. Community engagement and recreational use of drones

The timeframes are defined as:

- 2024-2026 short-term
- 2026-2028 medium-term
- 2028-2030 long-term

## Industry growth

Drone industry growth in the Territory will be underpinned by research & development (R&D), technological innovation, investment attraction and the development of strategic infrastructure, and investment attraction. By getting these settings right, the Territory can create an enabling environment which positions the region as a leader in the development and adoption of drone technology.

As demand for drone services within the NT Government grows, it can further support industry growth through the procurement of drone services from local providers.

The Drone Industry Strategy has identified the following key actions under this focus area:

| | Action | Lead | Timeframe |
|---|---|---|---|
| 1.1 | Facilitate the use of the Katherine Test Facility for R&D activities by industry | NACAS | Short |
| 1.2 | Support the development of NT test and development facilities | DITT | Ongoing |
| 1.3 | Establish pilot/demonstrator programs using drones to address industry challenges | DITT (Industry Strategy) | Short |
| 1.4 | Establish a Drone Innovation Challenge | DITT (Business Innovation) | Short |
| 1.5 | Promote the Territory drone industry at NT events such as October Business Month | DITT (Business Innovation) | Ongoing |
| 1.6 | Promote the capabilities and expertise of the Territory drone industry to interstate and international proponents/investors and at national forums such as AAUS RPAS in Australian Skies | NT Drone Industry Network | Ongoing |
| 1.7 | Provide high-level investment facilitation services for drone companies entering the Territory market | DCMC (Invest NT) | Ongoing |
| 1.8 | Promote the NT as a drone industry development hub abroad | DITT (International Engagement) | Ongoing |

## Strategic infrastructure

Investment in strategic infrastructure such as testing, training and maintenance facilities, air traffic management systems and communication networks will set the foundation for safe and efficient use of drones across sectors. Opportunities to establish local advanced manufacturing and 3D printing capability should also be considered as the industry continues to grow. This infrastructure will provide support for local industry, boost local supply chains, and promote investment attraction from interstate and overseas drone companies.

Drones can help to address infrastructure and maintenance challenges in remote areas, enabling communities to better manage their resources and infrastructure. Many areas in the Territory are difficult or dangerous to access and are easily cut off during the wet season or major weather events. Drones have the potential to minimise supply chain disruptions when such extreme weather events contribute to infrastructure damage that impacts the flow of service delivery. Drones can also be used to access and inspect these areas reducing the risk to workers as well as the cost and time associated with traditional methods of surveying and monitoring. Successful examples of this have been seen in remote areas in Western Australia where companies such as Western Power are using drones to inspect assets such as power lines[34]. The NT Power and Water Corporation has explored similar technology to support these activities in the Territory which would further support regional infrastructure activities.

In addition to surveying and monitoring, there is a significant opportunity for drones to increase connectivity throughout remote areas of the NT. A lack of secure and high-speed internet and satellite coverage is an ongoing challenge for many parts of the Territory. The NT Government continues to invest significantly in upgrades to fibre networks, while low-earth-orbit satellite networks, like OneWeb and Starlink, are expected to significantly improve communication and connectivity in remote areas. The growing accessibility and affordability of communications network coverage throughout the Territory will help in reducing black spots across regional and remote areas, reducing a key bottleneck to the use of long-range drones across the Territory[35].

## Research and development

The Territory, fuelled by its diverse environment and unique challenges, offers an ideal testing ground for drone research and development (R&D) opportunities. Ground breaking projects are already underway including the Department of Climate Change, Energy, the Environment and Water's (DCCEEW) BVLOS drone operations in Kakadu, the Bibi Planes for Health project, funded by NT Health and iMOVE CRC and a project funded under the Emerging Aviation Technology Partnerships (EATP) Program which aims to build supply chain resilience in health care for remote Indigenous communities[36].

Supporting R&D through pilot or demonstrator programs will encourage the industry to innovate and progress development of critical technologies such as BVLOS operations, advanced sensors and swarming technology. Advancements in these areas will be critical for the Territory to keep up with the industry and to develop tailored solutions which address the Territory's unique challenges. Successful pilot programs will serve as valuable case studies across a range of industries to attract further investment to address Territory challenges and support growth of the local industry.

[34] Western Power, *Drones take flight in maintaining power network*, 2023
[35] Northern Territory Council of Social Service, *National Indigenous Australian Agency Indigenous Digital Inclusion Plan consultation*, 2021
[36] Department of Infrastructure, Transport, Regional Development, Communication and the Arts, *EATP Round One announcements*, 2022

**CASE STUDY: North Australia Centre for Autonomous Systems**

The North Australia Centre for Autonomous Systems (NACAS) is dedicated to cutting-edge research and comprehensive training in the implementation of unmanned aerial systems across various industries, businesses, and sectors relevant to North Australia and the Asia Pacific regions. Strategically situated in Darwin, NACAS boasts a state-of-the-art engineering facility and flight-testing areas that provide unrivalled airspace for drone testing.


*"NACAS acts as the northern hub for academia, government, and industry, and enables drone manufacturers to showcase their products and integrate them with the evolving needs of end-users. Darwin's strategic location and unparalleled access to uncluttered airspace make it an ideal location to trial, test, and systems integrate emerging aviation technologies. Recognising autonomous technologies as a prominent area for investment and growth in the country, NACAS diligently works towards reinforcing connectivity between the academic and engineering advancements in southern regions and the Northern Territory"* (Professor Hamish Campbell, Director of NACAS)

## Test and development facilities

**NACAS flight test ranges**

To assist with the research and development of drone services in the Northern Territory, NACAS has developed two flight test ranges. NACAS has been awarded a CASA training instrument to operate BVLOS operations in these areas.

The first area is situated 14 km North of Katherine on the CDU Katherine Rural Campus. This range spans 4000 hectares with minimal human habitation, low infrastructure and operates under the RAAF Tindal restricted air space with a 1000-foot ceiling. This setting allows for controlled BVLOS operations, along with a 30km flight corridor for point-to-point drone operations.

The second test area that NACAS has clearance to fly, is Crown Land in the Koolpinyah area, north of Palmerston. This site is only a 30-minute drive from the NACAS facility and Darwin CBD and boasts similar characteristics of low human habitation and infrastructure.

**CDU-RMIT Industry 4.0 TestLab**

The CDU-RMIT Industry 4.0 TestLab, located in Darwin was established to increase advanced manufacturing capability in the Territory. The TestLab aims to bring researchers, industry and SMEs together to boost capability and address the future technological and workforce requirements of Australia's defence and aerospace sectors.

The TestLab offers users the opportunity to construct, test and flight simulate UAS using the latest manufacturing technologies such as 5-axis milling and metal and composite 3D printing.

The facility has a wide range of high-tech equipment including an Automated Fiber Placement Robot, the Quanser autonomous vehicle research studio, indoor drone flight testbed, industrial carbon fiber 3D printer and multiple drones.

The TestLab supports Territory businesses to access expertise and equipment to enhance UAS capability across research, training, and development.

## Education, training and workforce development

Digital transformation and technological advancements are revolutionising the way we live and work. The Territory must prioritise education, training and workforce development initiatives that ensure its workforce is equipped with the skills and knowledge to succeed in a digital world. A clear education and training pathway is required to support people to pursue drone related learning from primary school through to the workforce.

The Drone Industry Strategy has identified the following key actions under this focus area:

| | Action | Lead | Timeframe |
|---|---|---|---|
| 2.1 | Work with local industry to promote the drone industry and employment pathways to students | Drone Industry Network Committee supported by DITT, DoE, CDU | Ongoing |
| 2.2 | Implement digital badges/micro-credentials designed for First Nations students | CDU | Short |
| 2.4 | Support the integration of drone related units into school curriculums and promote drone training pathways | DoE | Medium |

| | | | |
|---|---|---|---|
| 2.5 | Develop an online database of local NT drone service and training providers | Drone Industry Network Committee | Short |

## Jobs and skills requirements

Like many jurisdictions, the Territory is facing significant skill shortages which is impacting many industries including drones. Addressing these issues requires a collaborative effort from industry, government and educational institutions. To facilitate sustained growth across the drone value chain, the Territory must develop local skills, upskill the current workforce, import new talent and engage regional and remote workforces.

NT drone industry stakeholders identified a mismatch between existing and required drone-related skills as the biggest workforce challenge facing the industry[37]. Adding to this challenge, is the issue of the number and type of new jobs created by drones being unsuitable for the group of workers in traditional roles who will be displaced by drones[38]

## STEM education

The role of science, technology, engineering and maths (STEM) education in developing the future workforce cannot be understated. STEM education empowers students to think critically and develop innovative solutions to address real-world challenges.

Drones represent an engaging way to deliver STEM education and expose students to potential career pathways. Using drones in schools provides opportunities for interdisciplinary learning where students can learn about engineering, coding, data analysis, image processing and a range of other skills. Beyond this, drones have the potential to increase STEM participation for students who may not otherwise pursue STEM subjects.



[37] NT Department of Industry, Tourism and Trade, Drone Industry Survey, 2023
[38] iMove CRC, *Validating the benefits of increased drone uptake for Australia*, 2023

**CASE STUDY: Manyallaluk school drone projects**

Manyallaluk School, located 100km north-east of Katherine has been using drones for innovative STEM education projects since 2018. The school initially purchased a drone to complete aerial surveys to monitor the movement of feral buffalo throughout the local area. Students used the scientific method to develop hypotheses, then flew the drone on weekly missions to photograph the herd along a stretch of winding creek. The drone data was then compiled and analysed to understand the movement patterns of the buffalo.

The project demonstrated the potential for drone technology to complement traditional knowledge systems used to care for country. Students presented the results at the NT Natural Resource Management Conference and were awarded a trophy for the project. The school plans to continue using the drone as part of the school curriculum and is considering how drones can be used to support wildlife monitoring and land management activities.

*"When we began teaching at Manyallaluk School, we became increasingly aware of a Federal Government push to develop STEM learning as this is going to be increasingly vital, and already is vital. We really had no idea about STEM or what to do. Added to this, there was also a really wonderful increasing awareness of the importance and power of student voice. So when a couple of our Year 6 boys said we should buy a drone for school, we jumped on the idea with both nervousness and excitement! When we got the drone, our whole community was interested in it and it really did help with school engagement. We have so many stories of at-risk kids who began to like school because we have focused so heavily on using STEM for Learning on Country and then bringing that back into the classroom to make things like writing really exciting and relevant. It also builds relationships and assists in two-way learning (teachers teaching kids and kids/community teaching teachers). In addition to the drone we have also benefited from the purchase and use of spy cameras for wildlife surveys.*

*Our drone also helps build relationships through simple photography at community events and by assisting with beautiful footage in video tributes to loved ones who have passed-away at funerals. In the modern world of video games, even pre-school students can begin to learn the basics of operating a drone. Using hands-on, high-tech equipment is so empowering and engaging and has helped us to build-up our at risk students and get them fully onboard with learning and leading."* (Ben Kleinig, Principal Manyallaluk School)

## Training

The Territory must establish strong capabilities in drone education and training to ensure a sustainable pipeline of local talent. To do this, we need to increase the availability and visibility of local training and development options. Opportunities may also exist to export training to the Asia-Pacific region which will increase revenue streams and market growth and create opportunities for bilateral partnerships.

The following training options are currently available through NT Registered Training Organisations (RTOs):

- Remote Pilot Licence (RePL)
- Remote Pilot Licence upgrade (from 7kg- 25kg)
- Certificate III in Aviation (Remote Pilot) (also available through the VET for Secondary Students program for year 11-12 students)

Supplementary drone use, that is, workers who need to use drones as part of their employment as a value-add skill is increasing across many industries.[39] These are largely mission-specific skills which go beyond basic flight operations. Access to this sort of specialised training is more difficult as there is less demand and expertise available locally. The Territory drone industry could consider how additional training such as micro credentials could be provided to develop specific skills including but not limited to:

- Night Operations
- Thermal imaging
- Light Detection and Ranging (LiDAR)
- BVLOS
- Marine UAVs
- Swarming
- Survey and inspection
- Surveying & GIS
- Heavy-lift & Advanced Payloads



[39] Future Ready Workforce, *Skills Framework for the Queensland Drone Economy, 2017*

**CASE STUDY: Healthy Country Artificial Intelligence & Digital Training Program**

The Healthy Country AI and Digital Training Program is a collaboration led by Traditional Owners and Indigenous rangers across Australia with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), North Australian Indigenous Land and Sea Management Alliance (NAILSMA) and CDU.

The program is designed to enable research teams, Indigenous land and sea management organisations, and Traditional Owners to support those that are interested in becoming 'Indigenous digital rangers' to learn to use technology to responsibly collect, analyse and use data and AI that complements Indigenous knowledge and is used to monitor how well on-ground actions are contributing towards Healthy Country goals.

The program has three objectives:

- Engage Indigenous participants who are involved in caring for country activities across key parts of Australia.
- Enhance Indigenous Rangers' capabilities to use data and digital technologies to collect, access and use data for the evidence-based management of country, and support the protection of important areas and sites.
- Support networking opportunities for Indigenous land managers who are caring for country across Australia to enable peer-to-peer sharing and build connections for future opportunities.

*"NAILSMA has been supporting Indigenous Land and Sea managers across northern Australia to use technology to help manage Country for over 20 years. The challenge with new technology is to make sure people aren't left behind and that opportunities are created on country and work within the local decision making process and cultural governance.*

*Drones have become a common tool in recent times and many of our on-ground partners have embraced the technology. NAILSMA partnered with CSIRO, Microsoft, CDU and the Telstra Foundation and worked with Indigenous Land and Sea Managers in Queensalnd and the Northern Territory to develop and test training programs that matched the needs and use cases common across northern Australia. We established a program that starts with really simple skills that everyone can learn and ramps up to more technical skills such as planning drone missions suitable for consistent site survey methods. We believe that by having accessible micro-credentials that are relevant for the day to day operations of drones on Country is one of the keys to expanding the impact of this technology in Northern Australia."* (Ricky Archer- CEO, NAILSMA)

## Regulation and government settings

Regulation and government settings are critical for industry growth and should be continuously reviewed to ensure they remain fit for purpose in an emerging industry. The NT Government will continue to work with all levels of government to ensure that the operating environment in the NT is conducive to industry growth whilst maintaining safety and compliance standards.

A whole of government approach to drone data, procurement, training and safety will support the NT Government to expand its use of drones for government operations and service delivery. Under the right policy settings, the NT Government can be a leader in the use of drones and can also support industry growth by procuring drone services from local industry.

The Drone Industry Strategy has identified the following key actions under this focus area:

| | Action | Lead | Timeframe |
|---|---|---|---|
| 3.1 | Develop and implement a whole of government drone use policy | DITT (Business Innovation) | Short |
| 3.2 | Continue working to make a consolidated telecommunications coverage map of the NT publicly available | DCDD | Medium |
| 3.3 | Analyse existing drone-based data protocols and practices across government and identify future data needs | DIPL, supported by DCDD, DEPWS | Short |
| 3.4 | Develop data standards/guidelines to ensure drone data obtained by NTG meets data requirements when engaging with contractors/ third party operators | DIPL supported by DCDD, DEPWS | Short |
| 3.5 | Advocate for a risk-based approach to drone use in less populated areas, where appropriate, to facilitate increased activity in regional and remote areas | DIPL | Ongoing |
| 3.6 | Advocate for the NT drone industry and contribute to national drone initiatives as an active member of the AAUS | IDWG | Short |
| 3.7 | Undertake mapping and cost/benefit analysis for current and future NTG drone capabilities | DITT (Industry Strategy), IDWG | Medium |
| 3.8 | Develop policy templates/guidelines to support the uptake of drones within local governments | DITT Supported by DCMC, LGANT | Short |
| 3.9 | Establish a data management framework for spatial and drone data | DCDD supported by DIPL, DEPWS | Long |
| 3.10 | Establish an NTG Drone Pilot Group to share resources and learnings | TBD | Short |

## Supporting the national agenda

The NT Government is working with the Australian Government-led Commonwealth, States and Territories Drones Working Group to advance the national drone agenda and ensure a consistent approach to non-safety related drone regulation across Australia, including privacy guidelines, infrastructure planning and drone rule digitisation. The NT Government has participated in consultations and provided written submissions to support the development of the Aviation White Paper and will continue to proactively contribute to the development of national drone initiatives. Ongoing collaboration between governments, industry and the community will enable the development of a strong national policy framework which enables Australia to capitalise on the opportunities presented by drones.

## NT policy framework

The NT Government recognises the potential of drones and is implementing policy settings and protocols which support the safe use of drones within government as outlined in Figure 4.

The NT Government RPA policy provides policy direction to all agencies on the governance and safe use of RPAS for NT Government business and service delivery. This will ensure a consistent, compliant and coordinated approach to drone use across government.

The NT Government will continue to advocate for regulatory reform that recognises an appropriate risk-based approach to operating in remote and sparsely populated areas across the NT.

**PLACEHOLDER: CASE STUDY: RPAS Digital Platform**

The Commonwealth's drone rule digitisation project aims to improve access and awareness of non-safety drone rules across Australia, including rules in place addressing security or environmental concerns. Coordination across jurisdictions on geospatial data will help drone users to better understand the local rules that might apply to their flight plans.

The focus on data and digital governance is the foundation for an iterative, cooperative and consistent approach to drone rules in Australia, extending from improving digitisation and awareness, to rule impact analysis and cooperation of enforcement strategies.

To help drone user and community awareness of local rules, this collaborative national project is digitising rules for publication as:

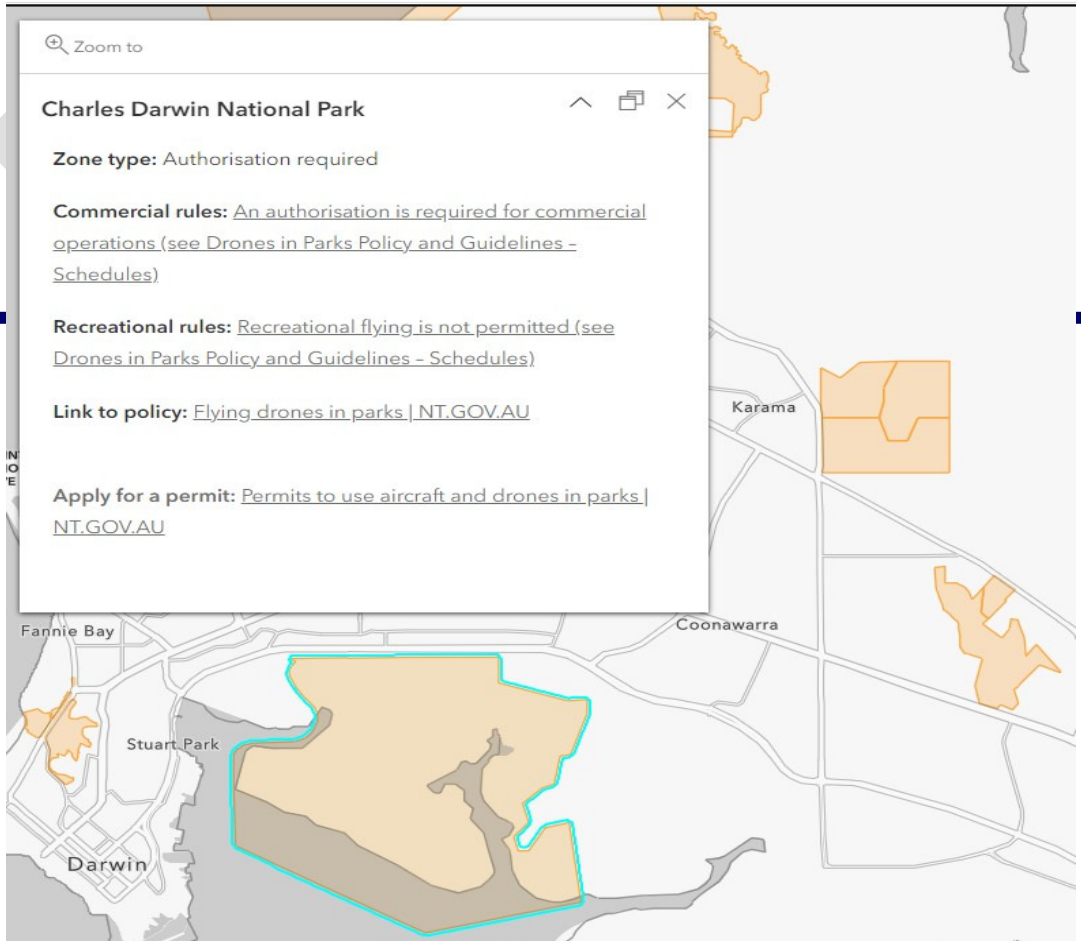
- an online interactive map, to be published on drones.gov.au
- open data for use by governments, industry, and research, supporting greater outcomes for awareness of rules
- an API (application programming interface) for use by software service providers, enabling seamless digital communication of non-safety laws as part of their broader drone flight planning systems, including to allow CASA-verified drone safety apps to publish rules.

DITRDCA is working with government and industry stakeholders to develop these deliverables for release as a prototype by early 2024.

The NT Government is contributing to the project, initially by providing data relating to Northern Territory Parks, to ensure that local drone rules are understood by users.

Further information can be found at Drone Rule Digitisation | Drones

Drones Usage Rules Map



## Community engagement and recreation

Community engagement will play a key role in growing the drone industry, increasing public awareness and acceptance and enhancing safety and compliance. Developing the recreational sub-sector of the drone industry through initiatives such as drone racing, recreational drone facilities and school holiday programs will provide opportunities for people to connect with their community, learn about drones, develop skills and boost the local economy.

The Drone Industry Strategy has identified the following key actions under this focus area:

| | Action | Lead | Timeframe |
|---|---|---|---|
| 4.1 | Develop web content to promote greater public awareness and access to drone resources | DITT (Industry Strategy) | Short |
| 4.2 | Establish a NT drone racing club/league | DITT (Business Innovation) | Short |
| 4.3 | Investigate the feasibility of a community/recreational drone facility | DITT | Short |

### Recreational drone facilities and drone racing

Recreational drone facilities and drone racing have a significant role to play in fostering innovation and attracting enthusiasts to the industry. Recreational drone facilities provide a pathway for students who are exposed to drones at school to pursue further development in the industry. Establishing purpose-built facilities with maintenance areas, charging stations and safety and compliance information helps to promote safe drone flying and an environment to enhance skills.

Recreational drone facilities are becoming increasingly popular with facilities established in Singapore, the US, South Korea, Japan and Australia[40]. Recreational drone parks can be established in existing outdoor parks or newly developed indoor arena style facilities, both of which offer benefits such as skill development, education, community engagement and increased compliance and safety[41]. To ensure recreational drone spaces are fit for purpose, they should provide access to maintenance facilities, charging stations and safety information, with some of the bigger facilities offering event spaces, tours, and retail and hospitality services[42].

Drone racing is one of the fastest growing e-sports in the world, combining elements of traditional sporting competitions with emerging technology[43]. Drone racing exists in both the real and virtual worlds and is accessible to all ages and physical capabilities[44]. Generally, the sport involves piloting a high-speed drone through a series of obstacles. The drones are equipped with cameras that broadcast live video to the pilots through virtual reality goggles to provide a first-person view (FPV) of the course[45]. The Drone Racing League is the world's premier drone racing competition and is now streamed on major networks including NBC, YouTube, Fox Sports and TikTok. The company reported that viewership reached 260 million in the 2022-2023 season[46].

Drone racing and recreational activities are not only a form of entertainment but also support the development of new technologies as participants work to increase the speed, agility and automation of

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[40] Arena21
DJI, *DJI Opens Its First Drone Arena in Korea*, 2016
Hillsborough County, *Mango Recreation Center,* 2023
[41] McNabb, M, *DJI Announces First Drone Arena in Japan*, Drone Life, 2017
[42] McNabb, M, *DJI Announces First Drone Arena in Japan*, Drone Life, 2017 Home Page - New | Arena21
[43] Federation Aeronautique Internationale, Drone racing, World Air Sports Federation, 2022
[44] Drone Racing World, *Welcome to Drone Racing World*, 2023
[45] Dean, G, *Drone racing: Everything you need to know,* Future US, 2021
46 Drone Racing World, *Welcome to Drone Racing World*, 2023

their drones[47]. The infrastructure and equipment required for recreational drone activities is relatively inexpensive compared to traditional aviation sports, making it an appealing choice for people of all ages and abilities.

The Territory could benefit from establishing recreation facilities and a Territory drone racing league to capitalise on the range of existing events including Drone Racing Australia's Drone Nationals, X Class Drone Racing, military drone competitions, and local league events.

### Public outreach and education

Public perception of drones is diverse and while parts of the community are optimistic about the potential benefits, others remain apprehensive about the risks associated with the technology. The drone industry must work to address public concern around drone privacy, data collection, security and noise.

The NT Government is working to implement tailored rules and regulations for the use of drones in sensitive areas such as schools and correctional facilities. A policy has also been developed to regulate the use of drones in schools.

Drone organisations and operators can contribute to public education efforts by adhering to drone regulations, promoting the potential applications and benefits of drones and acknowledging the limitations of the technology.

The Territory drone industry should engage in outreach initiatives including public awareness campaigns, educational programs, and use of resources such as CASA's drone safety signage to address misconceptions and increase public confidence in the technology. Advancements in remote identification technology will also contribute to drone safety by providing information about who is using drones and where, to hold operators accountable for their actions[48].

## What's next?

The NT Government will work with industry and community stakeholders to achieve the vision and implement the actions under the NT Drone Industry Strategy.

The Strategy's key actions will be implemented across short, medium and long term timeframes.

The NT Government is committed to providing public progress reports every two years in line with these timeframes. At each reporting period, the strategic actions will be updated and refreshed to reflect evolving industry circumstances.

## Acronyms

| | |
|---|---|
| BVLOS | Beyond Visual Line of Sight |
| CAGR | Compound Annual Growth Rate |
| CASA | Civil Aviation Safety Authority |
| CDU | Charles Darwin University |
| CRC | Cooperative Research Centre |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| DCMC | Department of Chief Minister and Cabinet |

[47] Lore, M, *Drone Racing League Doubles Broadcast Reach Thanks To Growing Global Interest,* Forbes, 2022
[48] Department of Infrastructure, Transport, Regional Development, Communications and the Arts, *Remote Identification Discussion Paper*, 2023

| | |
|---|---|
| DITRDCA | Department of Infrastructure, Transport, Regional Development, Communications and the Arts |
| DITT | Department of Industry, Tourism and Trade |
| EATP | Emerging Aviation Technology Partnership |
| eVTOL | Electric Vertical Take-off and Landing Vehicle |
| GDP | Gross Domestic Product |
| ICT | Information and Communication Technology |
| NACAS | North Australia Centre for Autonomous Systems |
| NAILSMA | North Australian Indigenous Land and Sea Management Alliance |
| NT | Northern Territory |
| NTG | Northern Territory Government |
| R&D | Research and Development |
| RAAF | Royal Australian Air Force |
| RePL | Remote Pilot Licence |
| ReOC | Remotely Piloted Aircraft Operator's Certificate |
| RPA | Remotely Piloted Aircraft |
| RPAS | Remotely Piloted Aircraft System |
| RTO | Registered Training Organisations |
| STEM | Science, technology, engineering and maths |
| TERC | Territory Economic Reconstruction Commission |
| UAS | Uncrewed Autonomous Systems |
| UAV | Unmanned Aerial Vehicles |
| US | United States |
| VET | Vocational Education and Training |