UNMANNED VEHICLES IN AUSTRALIA

UNMANNED VEHICLES OVERVIEW

- While there are no specific figures available for Australia's unmanned vehicles sector, it forms part of the larger 'Automation Opportunity' set to deliver a $1.5 trillion boost to Australia's national income by 2030.
- Australia is well-positioned to capitalize on the global growth in the unmanned vehicle sector:
  - Australia has demonstrated a willingness to adopt and integrate unmanned vehicles into operations – i.e. Australia is a world-leader in the development and use of unmanned vehicles in the mining and resources sector.
  - With the global market for unmanned vehicles still relatively immature outside of defense and border security, Australia represents a perfect proving ground for new technologies and solutions.
  - Australia is an established and globally recognized leader in robotics and autonomous systems research

UNMANNED VEHICLES OVERVIEW

Unmanned Vehicles – Air

- The Australian Unmanned Aerial Vehicle (UAV) industry is developing at a revolutionary pace:
  - In 2017, the number of remote pilot licenses holders grew by 65% to 7,380; and grew by 49% again in 2018 to 10,999.
  - In 2017, the number of Remotely Piloted Aircraft Systems (RPAS) operator certificate holders grew by 70% to 1,283; and then by a further 17% in 2018 to 1,504.
- The Australian commercial drone industry is maturing in terms of technology, safety and sophistication as regulators, operators and the public start to come to terms with the emerging technology.
- Regulatory hurdles are one of the biggest challenges facing the industry. However, as experience with drones has grown, Australia's regulators are displaying greater confidence, and an increased willingness to enable drone activities, in direct contrast to other countries.
  - Alongside local Australian companies, industry leaders are playing a key role in interfacing with regulators, with their efforts leading to a noticeable shift in perspective, including the Civil Aviation Safety Authority (CASA).
  - The future regulatory landscape is evolving, with CASA taking a 'fast-follower' approach, with a view to aligning with other jurisdictions. CASA's forthcoming regulatory roadmap will provide key insights.

UNMANNED VEHICLES OVERVIEW

Unmanned Vehicles – Land

- The global unmanned ground vehicles (UGVs) market is projected to grow at a CAGR of 14.81% from $2.7 billion in 2018 to $7 billion by 2025.
- The military application of UGVs is forecast to lead market growth, with the Asia-Pacific region projected to be the fastest growing market.
- The Australian UGV market is set to expand in line with global trends, with significant opportunities in defense, primary sectors such as agriculture and mining – where Australia is already a world leader – and tertiary service sectors like emergency, logistics & distribution, and healthcare.

Autonomous Vehicles – Road

- Australia is committed to leveraging autonomous vehicle technologies to improve the safety, efficiency and sustainability of its transport system.
- Australia's future transport market – worth $147.8 million in 2016 – is predicted to generate more than $11.25 billion in revenue by 2025.
- Self-driving vehicles are estimated to provide a $66.5 billion economic opportunity.
- In 2019, Australia was ranked 15th in KPMG's Autonomous Vehicles Readiness Index.
    - There remains strong government support at all levels for the development and further implementation of automated vehicle technologies.

UNMANNED VEHICLES RECENT DEVELOPMENTS

- Since 2015, the Australian federal government has flagged emerging technologies, such as unmanned vehicles, as an essential aspect of its National Innovation and Science Agenda (NISA), and made a concerted effort to drive investment in the sector.
- In June 2018, the government-funded Australian Centre for Robotic Vision released a Robotics Roadmap for Australia, detailing how the country can best harness the economic and social benefits of new robotic and automated technologies.
- In December 2018, the federal government published its national digital economy strategy Australia's Tech Future: Delivering a strong, safe and inclusive digital economy.
- Over the last 6 years, the federal government has invested more than $3.2 billion into robotics and autonomous technologies.
- In the 2018-19 federal budget, the government increased the Commonwealth Scientific and Industrial Research Organization's (CSIRO) funding by over $28 million, taking its total funding allocation to $590.5 million.
- State and federal governments have made concerted efforts to provide funding and grant programs to speed the uptake of UAV and UGV technologies in sectors such as agriculture.

UNMANNED AERIAL VEHICLE OPPORTUNITIES

Defense and Security

- Defense and Security remain the largest segment of the Australian unmanned aerial vehicles sector, with the 2016 Defense White Paper identifying a clear need to expand the Australian Defense Force's (ADF) UAV capabilities.
- In the last two years, the following procurements have been announced:
  - In November 2018, the federal government announced the selection of the General Aeronautical Systems MQ-9 Reaper variant as Australia's first armed UAV to be acquired. 12 to 16 aircraft would be acquired and delivered by 2023.
  - The federal government is currently looking for an unmanned aircraft system to operate from 12 Arafura offshore naval patrol vehicles (OPVs) and 9 Hunter-class future frigates.
  - In September 2018, the ADF announced the roll out of two fleets of handheld drones to compliment its existing fleet of larger, catapult-launched Textron System Shadow 200 Tactical UAVs.
  - The federal government has also made investment in R&D programs designed to further develop the ADF's UAV capabilities.

UNMANNED AERIAL VEHICLE OPPORTUNITIES

Mining and Resources

- Australian mining and resource companies are increasingly turning to UAVs to conduct exploration, asset inspection and maintenance, and advanced mapping operations in order to realize improvements in safety, increase efficiencies, and cost savings.
- BHP Billiton was one of the first companies to begin using UAVs, employing them in various operations across their mine sites since 2015.
    - They are used to improve road safety by monitoring traffic, road conditions, and hazards; and to help inspect overhead cranes, towers, and roofs of tall buildings to avoid working at height.
- The use of UAVs in the mining and resource industry is forecast to expand further.
- There is also a significant energy and utilities market for UAV technologies:
    - UAVs are increasingly being used for asset inventory and maintenance management of power, solar, water, and wind infrastructure networks.

Agriculture

- AgTech is set to become Australia's next $70 billion industry.
- Farmers have described UAVs as the most exciting tool in agriculture.
- Regulatory reforms allow private landowners to fly drones of up to 25kg in weight over their own property without requiring a license or operating certificate.
- The use of UAVs to map crops and properties is building momentum as the new buzzword is 'smart farming', delivering low-cost precision agriculture.
- UAVs are also being used for spot spraying, seed planting, pollination and to check infrastructure.

UNMANNED AERIAL VEHICLE OPPORTUNITIES

Agriculture

- In May 2017, the federal government announced an investment of more than $700 million to carry out phase two of the National Landcare Program.
  - This includes the $94 million Smart Farms program to support the development and uptake of best agricultural practice, tools and technologies.
- The majority of state governments have made funding and grants available for the adoption of UAV technologies.

Emergency Services

- UAVs are being used to locate missing persons in search and rescue operations, provide real-time assessment of firefighting tactics, improve emergency responders' situational awareness, and deliver remote medical supplies.
- Surf Life Saving Australia (SLSA) is looking to expand its UAV program to more beaches around the country, as well as conducting drone trials equipped with thermal cameras to pick up the heat signature of someone lost in rough seas, as well as detect heat signatures from predators such as crocodiles.
- There is significant market opportunity for UAV systems in delivery of emergency medical supplies to remote and rural areas.
  - Rural and remote medical service providers, such as CareFlight and the Royal Flying Doctor Service, are actively investigating the best ways in which to introduce drones into service.

UNMANNED AERIAL VEHICLE OPPORTUNITIES

Logistics and Distribution

- Australia is one of 3 countries where regulations allow for routine deliveries by UAV.
- Australia's total market for drone delivery solutions represents an opportunity in the $10s of millions for the civilian market alone.
- There are opportunities for long-range UAV delivery systems to supply essential parts and equipment – i.e. tools and small items such as electronic parts or components for solar panels, and hydraulic systems – in rural areas.

Aerial Imaging

- The aerial imaging capabilities offered by drones are transforming Australia's construction, real estate, insurance, and media and entertainment industries.
  - The use of drones is now standard operating procedure for real estate agents.
  - UAVs are used to record images of the damage to homes and building after natural disasters, and automobiles at crash sites. By combining drones with machine learning, insurance companies are able to improve predictions of damage, better assess risks, and set premiums more accurately.
  - UAVs have become crucial tools for conducting site and asset inspection work in safer, more efficient and cost-effective ways.
  - Traditional means of hoisting cameras or using helicopters for above ground shots are rapidly being superseded by UAVs.

UNMANNED LAND VEHICLE OPPORTUNITIES

Defense and Security

- The 2016 Defense White Paper identified a clear need for Australia to expand the ADF's future UGV capacity.
- The ADF has made UGVs a priority, seeking to develop significant combat advantages from the sensors, smarts, protective and lethal systems that UGVs carry.
- The Army anticipates further investment in UGVs for reconnaissance, logistics and casualty evacuation, and manned and unmanned teaming between helicopters and future UAVs.
- The ADF continues to invest in Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) capabilities and autonomous systems, with a number of strategic procurements being processed.
    - This includes recent upgrades to the ADF's fleet of QinetiQ TALON counter-IED robots, originally procured in 2009 under a $16.1 million contract.

Mining and Resources

- Australia is the global leader in the use of UGVs and automation technologies within the mining sector.
- Opportunities still exist for companies, particularly in regard to solutions driving better safety outcomes, higher productivity, and providing more economic remote and small-scale extraction.

UNMANNED LAND VEHICLE OPPORTUNITIES

Mining and Resources

- Demand is continuing to increase as a result of the clear economic benefits produced by employing autonomous haulage systems (AHS):
  - 10% reduction in fuel consumption, 14% reduction in maintenance costs, 12% increase in truck lifetime, and 12% increase in productivity.
- Demand for AHSs are therefore high, typically to enhance existing mining trucks with robust autonomous sub-systems.

Agriculture

- The federal governments $94 million Smart Farms program forms part of a more than $700 million investment to carry out phase two of the National Landcare Program between 2017 and 2023.
- Australian agriculture has been an early adopter of UGVs, and is home to ground-breaking research into the use of unmanned vehicles and automation.
- The University of Sydney's Australian Centre for Field Robotics (ACFR) is recognized internationally for its world-leading research, development, commercialization and theoretical contributions to the development of farm robots and UGVs.
- In addition to research developments, there are significant opportunities in terms of the autonomous control of tractors and combine harvesters.

UNMANNED LAND VEHICLE OPPORTUNITIES

Logistics and Distribution Services

- With eCommerce growth accelerating, and consumer appetite for on-demand delivery continuing to increase, optimizing 'last-mile' delivery presents an opportunity for UGVs.
- The 'last-mile' of delivery is one of the most complex tasks in the supply chain, and often the least efficient and most expensive part of the process.
- The use of UGVs as autonomous last-mile delivery robots is starting to gain traction.
- Deployment of delivery UGVs have not progressed beyond pilot phase, but the market is expected to shift quickly in the next 5-10 years with up to 80% of last-mile deliveries predicted to by autonomous by 2025.

Healthcare and Emergency Services

- Australian hospitals have been trialing the use of UGVs to increase the efficiency of hospital infrastructure and essential logistics operations.
  - Lamson Concepts' partnership with the Sunshine Coast University Hospital has seen the deployment of Lamson Automated Guided Vehicle system, Tanscar, which automatically transports meals, laundry, waste and supplies through the hospital.
- Australian emergency services are looking to invest in UGV technologies in order to boost their operational capabilities, particularly in relation to urban search and rescue, bomb disposal, and firefighting.
  - Fire and Rescue NSW have been using fire-fighting UGVs since 2015.

AUTONOMOUS ROAD VEHICLE OPPORTUNITIES

- Self-driving vehicles are thought to provide a $66.5 billion economic opportunity to Australia, and Australia's future transport industry is predicted to generate more than $11.25 billion in revenue by 2025.
- At present, with the regulatory framework for autonomous vehicles still in development, companies looking to enter the market are encouraged to explore opportunities to partner with Australian governments and industry in developing autonomous vehicle trials.

Australian Capital Territory

- The ACT Government is supporting a 2 year CANdrive automated vehicle trial that will include testing driver monitoring systems on 40 residents driving semi-automated vehicles for up to 2 weeks at a time.

New South Wales

- The NSW Government is trialing automated vehicles on Sydney's major motorways.
- NSW is also trialing automated shuttle buses at Sydney's Olympics Park.
- In its 2018 budget, the NSW Government budgeted an additional $7 million over 4 years for further autonomous vehicle trials.
- NSW Government's $5.8 billion Metro Northwest Project is also utilizing autonomous vehicle technology with its fleet of driverless trains.

Queensland

- The QLD state government is delivering the Cooperative and Automated Vehicle Initiative (CAVI), which will be the largest on-road testing trial seen in Australia.

AUTONOMOUS ROAD VEHICLE OPPORTUNITIES

Northern Territory

- In November 2017, the NT Government completed a 6 month trial of an EasyMile Driverless Shuttle Bus Trial on the Darwin Waterfront Precinct. Now in its second stage, the vehicle is moving people to and from restaurants and shops.

South Australia

- South Australia was the first state to showcase automated technology in a 2015 trial with Volvo.
- South Australia is conducting multiple trials of automated, electric shuttle buses, supported by the state governments Future Mobility Lab Fund.

Victoria

- The Victorian Government has led a 2 year trial of semi-autonomous vehicles which has involved passing enabling legislation.
- VicRoads, the Transport Accident Commission, and Bosch have partnered to build the first Australian-developed vehicle with self-driving capabilities.
- The Government has allocated $6.3 million in funding to their Towards Zero Connected and Automated Vehicle Trial Grants Program.

Western Australia

- Western Australia was host of Australia's first automated bus trial on public roads.
- Perth was announced as 1 of 3 cities in the world to host a trial of electric-powered autonomous vehicles.