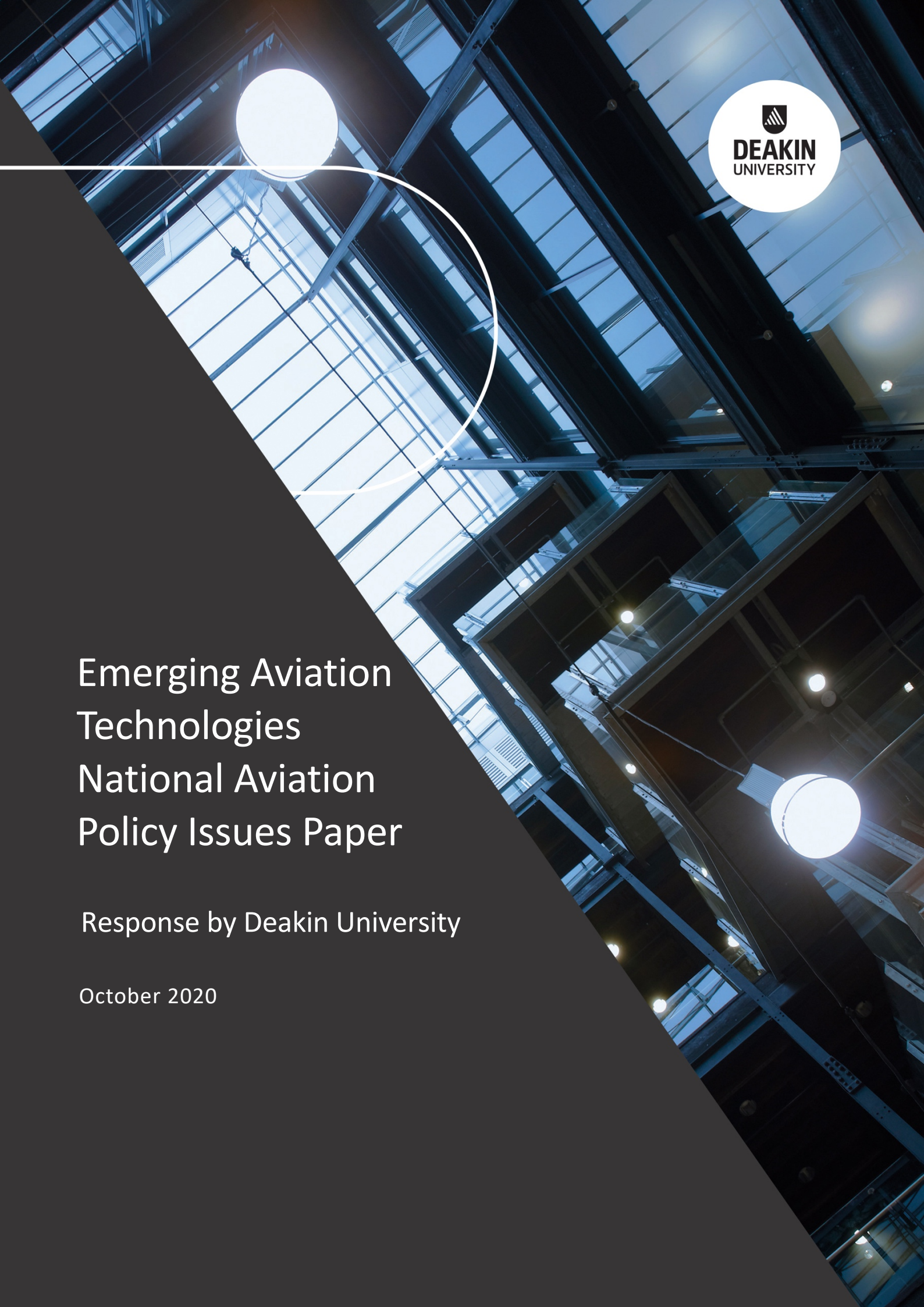

Emerging Aviation Technologies National Aviation Policy Issues Paper

Response by Deakin University

October 2020

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To

Director, Airspace and Emerging Technologies

Department of Infrastructure, Transport, Regional Development and Communications

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From

Deakin University

Deakin University recognises the importance of transport and supply chain systems for the Australian community in our urban, suburban, regional and rural areas. Deakin Mobility is leading the way by bringing together industries, communities and our researchers to identify the opportunities and address the technical, social and environmental challenges in the rapidly evolving world of new, inclusive mobility.

Deakin is uniquely placed to contribute to the emerging aviation industry, with its expertise and proven outcomes in advanced materials, battery technology and manufacturing – areas of specialty that Advanced Aerial Mobility relies on. Research and academia play a central role in the field: in the development of enabling technologies, in exploring the implications, and in providing the evidence base to guide sound decision-making.

A National Aviation Policy for the management of emerging aviation technologies and a whole of government effort are significant steps to towards a safe, sustainable and equitable use of Australian airspace to support social and economic prosperity.

This response to the proposed policy approach considers civilian use cases of eVTOL and drones in line with the scope of the policy paper, with a focus on aerial transport services for passenger and freight.

We appreciate the opportunity to contribute with this submission to the development of the National Policy and the emergent sector and look forward to learning more about the views of government, industry and the community.

Our response to Emerging Aviation Technologies National Aviation Policy Issues Paper

1. **Do you agree with the proposed core principles for the National Emerging Aviation Technologies policy?**
   - We are in support of the core principles for the development of the National Emerging Aviation Technologies policy. The department has identified key areas of opportunity and related issues, and a Commonwealth led collaboration between national and state/territory governments, industry, research and education, and community stakeholders will provide an effective approach to ensure an ongoing safe and nurturing ecosystem for the sector.
   - It is suggested that the market management approach incorporates a method to capture and share information and key lessons learnt over time.
   - The principles should support the diversity of visions for emergent technologies within advanced aerial mobility (AAM), including multiple aircraft types and market applications, while shaping decisions that enable their effective realisation.

2. **Will the proposed approach to policy development adequately allow for the future direction, operations and investments of your business/organisation?**
   - The proposed approach to policy development effectively covers the key elements involved in the development of AAM and management of drones and eVTOL aircraft to foster innovation, ensuring clarity in direction and facilitating interoperability and national consistency.
   - Policy development requires research and the proposed approach recognises research and evidence to inform policy decisions. A research program might be informed by the future program areas recommended in Deakin's recent AAM white paper (link), and build upon the strengths of research and innovation within Australia.
     - Creighton, D., Parsons, H., Alvarez, L. M. U., Gunn, B., Perez-Franco, R. and Johnstone, M., September 2020, *Advanced Aerial Mobility and eVTOL Aircraft in Australia: Promise and Challenges*, Deakin Mobility Series.

3. **Are there any other approaches that could benefit the sector?**
   - Commonwealth led noise regulations and standards, particularly taking an interim risk-based approach to regulation, are practical in facilitating state government processes and learning for operators in relation to community acceptance. Localised and ground-based noise limits can enable greater flexibility for operators.
   - Beyond noise, it is suggested an additional focus is needed to understand how community wellbeing will be addressed and balanced over time in order to maximise value of emerging aviation technologies while minimising disturbance, i.e. delivery of supplies creating value in remote communities versus excessive airspace traffic as operators scale up within urban environments. This means early and continuing support for community and industry requirements ensuring equitable access of airspace for users and viewers.
   - We recommend establishing baselines and performance metrics against community perspectives, acceptance and impacts.

4. **What level of service and regulation do you expect from the Government?**
   - In addition to the activities proposed in the issues paper, there will be a need for a research funding investment by governments and industry stakeholders.
   - Training and education will also be required to manage the skills and competencies of pilots, airspace management, AAM operators, service and maintenance groundcrews, and other ancillary services.
   - It is also suggested to make provision for community awareness and education programs.
   - Privacy protection: the proposed policy justly raises the issue of privacy as a major concern. Drone technologies are capable of massive data collection, for various purposes. The growth in public and private sectors' use of drones for commercial, public services, and other purposes, creates concrete risks to the Australian public's data privacy. These risks intensify as data privacy in Australia is loosely protected by a web of Commonwealth, State, and Territory laws, regulations, and guidelines. Currently, different rules apply to public sector entities and to private sector entities, and specific legislation exists with regard to certain types of data (such as health data) and to certain data collection methods (such as surveillance). As a result, effective privacy protection requires not only harmonisation of the aviation regime across Australia, but also harmonisation of data privacy laws. Moreover, in tandem with the development of this policy, the Government is advancing data sharing legislation to enhance sharing of data among public sector entities and between public and private sector entities. The proposed policy should, therefore, take into account the additional vulnerabilities deriving from the combination of more drones in the public and private spaces, and enhanced data sharing regimes.

5. **What are your expectations of the Government's role and responsibilities in the management of drones and eVTOL vehicles?**
    - Coordination, understanding and support of the national policy across all levels of government with clarity on the roles at each level.
    - Define a vision, create incentives, set key targets and establish a pathway to innovation.
    - Clearly define the responsibility of who carriers the economic and business risks in an emerging transport sector of AAM.
    - At the state and local levels, it is also important to explore and define overarching visions for potential aerial mobility networks and their integration with existing ground-based transport systems and infrastructure, with consideration to both customer and community sensitivities.
    - Exploration and testing concepts around vertiports and potential network configurations is an important step to facilitate understanding on how industry proponents can be accommodated, and communities supported.
    - Consideration of communication practices is needed across transport modes and transport infrastructure, including communication technologies, frequencies, protocols and standards.
    - Technology is advancing to: (1) support a transition from piloted to remote piloted aircraft or autonomous aircraft systems; (2) to reduce noise disturbance; and (3) to reduce emissions. As such, the regulations will need an agile and staged approach to adjust progressively. In addition, the operating conditions for aircraft and vertiports will need to be defined and adjusted according to the evolving technology and environmental contexts as well as the evidence raised over time. Education and communication protocols should also be in place to provide clarity to government, industry and community stakeholders.
    - Ethical issues around partial to full autonomy will need to be carefully investigated and a full consultative process with engagement of members of public.
    - Preparedness towards air vehicle crashes, accident management and disaster recovery. For example, disaster management and recovery after a drone crash into a critical infrastructure causing major disruptions. Encourage public and private collaborative initiatives to evaluate eVTOL and drone 'network' deployment and test the assumptions on how emerging aviation technology could best promote liveability and economic growth across different local areas and support business cases. For instance, in what contexts might drones and eVTOLs relieve congestion problems, and in what contexts might eVTOLs and drones add to an air congestion problem?

6. **What are the key opportunities that these new technologies could deliver for Australia?**
    - The issues paper accurately recognises the opportunities for the operation of drones and eVTOL technology across various sectors and it is understood that we are just at the beginning of imagining what could be in terms of the potential applications.
    - We acknowledge the potential for significant social and economic benefits that can be obtained from improving connectivity between regional and rural areas and large urban and suburban areas. Regional Air Mobility (RAM) can also benefit smaller airports.
    - The development of a new transport mode will lead to more jobs and greater investment by Australian and overseas companies.
    - From a transport perspective, drones and eVTOLs to sustain the AAM ecosystem could enable the development of a specialised supply chain. Deakin University's white paper on Advanced Aerial Mobility and eVTOL aircraft in Australia (link) identified the following sectors for job creation and investment opportunities:
        - transport operations carrying passengers and goods
        - vertiport operations
        - construction and infrastructure services dedicated to vertiports and asset monitoring
        - equipment manufacturing and maintenance services linked to aeronautical products, such as aircraft related hardware and software (including vehicle testing, routine airworthiness activities, maintenance centers and in field servicing)
        - utility and future fuel providers (such as hydrogen)
        - aerospace specialised recycling firms
        - commercial and industrial real estate
        - security services
        - skills, training, research and development
        - auxiliary activities such as insurance, finance and management.

7. What are the most significant barriers to realising these opportunities?

- While exceptions are possible for some UAS to operate, the regulatory framework for AAM is not yet ready, and developing the standards and regulations for aircraft, operations and systems will take time. Furthermore, there is still a need for trials and research to raise the knowledge and evidence base, to inform common understanding, and to support agreement for the implications related to the emergent technology and the operations.
- Aviation is a sector that continues to grow and there is currently a global shortage of skills in infrastructure, transport operations and relevant areas such as digital, telecommunications and automation technologies. Pilots, aeronautical engineers, trainers and software engineers will be required to enable the supply chain, particularly around aircraft manufacturing and maintenance services.
- AAM will need true integration into other transport networks to deliver maximum benefit. Consideration should be given to integration with both existing transport hubs and infrastructure and future ground-based transport technology networks.
- The biggest barrier for eVTOL passenger and freight services as a transport mode will be operational cost. The eVTOL aircraft technology enabling remote piloting and autonomy to reduce price points are still some time away.
- A major barrier in the protection of wildlife and cultural sites is not the presence of laws, policies, and regulations, but their enforcement. For instance, Parks Victoria require permits for those wishing to operate drones on their land. Despite this, countless people illegally operate drones on Parks Victoria land due to either ignorance of the laws, or apathy towards them. Proposed traffic management systems should include methods to restrict unauthorised drones and eVTOL from protected spaces. Education programs should be developed and disseminated to inform drone and eVTOL users around wildlife considerations.

8. What issues or actions should the government prioritise to facilitate the growth of emerging aviation technologies?

- The government plans to explore new classes of airspace, fit-for-purpose safety standards and noise management strategies that effectively support industry development and clarify the pathways toward AAM realisation.
- Collect data and evidence from local area testing of aircraft, operations and systems that incorporate community research to understand the attitudes toward (1) AAM and the variety and volume of aircraft acceptable to communities in the contexts of urban, suburban, regional and rural areas, considering the changes to the natural and built environment; and (2) the safety considerations in the transition to autonomy.
- Study approaches to determine the appropriate locations for vertiports and flightpaths that enable likely high service volumes desired by operators in order to achieve profitable operations but minimising community disturbance. There are significant limitations in urban areas compared to regional areas. As such, capacity maximisation for each vertiport, and therefore air services, will be constrained by real-estate size and local area limits around aircraft noise and air traffic, as well as potential security protocols. It will be important to initiate assessment of options with current land and asset owners where there is potential for developing communities and improving access to transport services while efficiently integrating with other transport modes.
- The establishment of an evolutionary, well-defined and communicated security framework coupled with continuous development of innovative drone and eVTOL security capabilities to effectively mitigate security risk. For passenger services, decisions on the security measures around passenger scanning and items allowed in flight, as well as what security activities can be automated, could influence the profitability for operators.
- Ensuring there is an understanding of the aircraft and infrastructure environmental footprint in the context of future transport, including manufacturing and the circular economy, not just operational footprints.
- Testing and understanding the technical performance of both drones and eVTOL under extreme weather conditions will be required to inform standards, in order to manage and mitigate disruptions.
- A staged development of the integrated airspace system and the UTM capability, from manned to unmanned systems represents an enabler. Progressive updates are needed in terms of characterisation of AAM data and formats and the development of data exchange standards to enable system integrations. Real time data processing will also be required to manage both scheduling and mitigation of noise and other contingencies.
- We recommend the development of national guidelines for the use of drones and eVTOL around wildlife that are based on peer-reviewed scientific research. Recent research at Deakin University on the impact of drones on wildlife indicates that general guidelines can be developed based on empirical evidence, and further research should be conducted to develop a nationally endorsed guideline. This needs to be undertaken across species, geographic and environmental settings.

- Raoult, V., Colefax, A.P., Allan, B.M., Cagnazzi, D., Castelblanco-Martínez, N., Ierodiaconou, D., Johnston, D.W., Landeo-Yauri, S., Lyons, M., Pirotta, V. and Schofield, G., 2020. *Operational Protocols for the Use of Drones in Marine Animal Research*. Drones, 4(4), p.64.
- Weston, M.A., O'Brien, C., Kostoglou, K.N. and Symonds, M.R., 2020. *Escape responses of terrestrial and aquatic birds to drones: Towards a code of practice to minimize disturbance*. Journal of Applied Ecology, 57(4), pp.777-785.

9. To what extent should Australia's approach be harmonised with approaches taken in other countries?

- Australian regulation is innovation driven and has kept pace with global advances in airspace and aviation. A harmonised approach to policy making and alignment with global standards and recommended practices is suggested to reduce regulatory barriers and benefit industry development. Australia should continue to engage in and contribute to international standard development committees and rulemaking guiding organisations such as ICAO and JARUS.
- Many countries around the world are starting to consider the inclusion of eVTOL and drones into their transport systems. Countries such as the USA and South Korea are more advanced and are presently exploring requirements and establishing visions and programs around airspace, aircraft and operations to inform regulations. In particular, the AAM National Campaign led by NASA, and their government/industry collaborative work around testing scenarios, can provide important lessons for Australia around new technology, safety risk, UTM and aircraft certification, an approach that South Korea is also eager to explore.

10. Are there other issues that the Australian Government should consider?

- The extent to which eVTOLs could be integrated into the Disability Standards for Accessible Public Transport (DSAPT) should be examined, with a view to optimising the coverage of the DSAPT consistent with its purpose. This might include investigation and analysis of access requirements of people with disability in relation to eVTOL.
- There is a need to benchmark emissions compared to Battery Electric Vehicles (BEV), as the future of transport is anticipated to be a combination of electric, future fuels and hybrid vehicles.
- The establishment of a national Unmanned Traffic Management (UTM) system is a crucial objective in the management of airspace; however, it does not address manned aircraft. Currently, the Automatic Dependent Surveillance Broadcast (ADS-B) air traffic surveillance technology is not mandatory in manned aircraft, meaning the location of many manned aircraft is unknown. The proposed traffic management system should integrate mandatory traffic management of both manned and unmanned aircraft to ensure airspace safety. This has been highlighted in Horizon 3 in the evolution in the market for long term planning but will be required as soon as multiple concurrent drone and manned operations are in the same airspace.

Acknowledgement

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