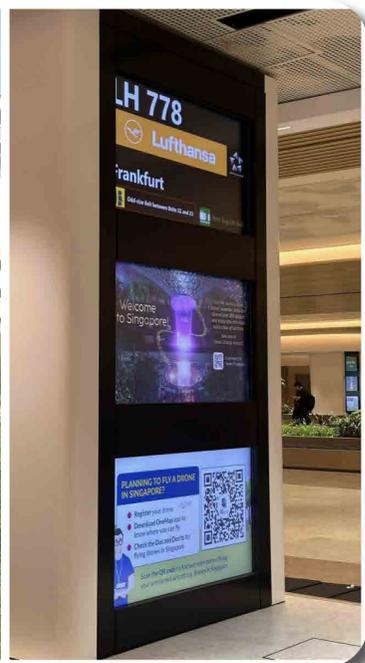


## MINISTER'S INNOVATION AWARD



### MERIT AWARD

## DATA-DRIVEN UNMANNED AIRCRAFT (UA) ENGAGEMENT AND OUTREACH PROGRAMME



### PROJECT TEAM



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#### IMPETUS FOR PROJECT

Despite the ongoing enforcement and traditional communication efforts, unauthorised UA incidents in no-fly zones, especially around Changi Airport, remained a persistent challenge. Analysis of the enforcement data revealed that most of the violations stemmed from a lack of awareness, rather than deliberate non-compliance of the UA regulations. This insight led to a re-imagined approach focusing on targeted and preventive education with UA operators and strategic collaborations with UA retailers and agencies.

Our vision is to create a comprehensive ecosystem of UA safety advocates, transforming from a purely reactive enforcement-based approach to proactive education of UA users through strategic touchpoints. The desired outcome is to significantly reduce unauthorised UA activities by addressing the root cause - i.e. lack of awareness - through targeted, data-informed engagement.

#### Statement of Need:

There is a critical need to address the persistent challenge of unauthorised Unmanned Aircraft (UA) incidents in no-fly zones, especially around Changi Airport through a more effective, data-driven approach. Traditional enforcement methods alone have proven insufficient, as data analysis reveals that most violations stem from lack of awareness rather than intentional non-compliance. This necessitates a paradigm shift from purely punitive measures to a proactive, education-focused strategy that engages UA operators at multiple touchpoints.

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#### EXTENT OF INNOVATIVENESS

Our innovative solution leveraged on data analytics to gather deeper insights on enforcement data to (i) identify the root cause of UA violations, (ii) identify specific groups responsible for the violations, (iii) develop strategies to target the specific groups, (iv) develop comms materials targeted to specific user demographics, behaviour patterns, and high-risk areas, and (v) outreach initiatives at key touchpoints for maximum impact.

The data-driven approach encompassed both quantitative and qualitative aspects of enforcement data, revealing crucial behavioural patterns and knowledge gaps. Key findings included:

**User Demographics:** Analysis revealed that the majority of offenders were new recreational UA users suggesting a clear target demographic for intervention.

**Behavioural Analysis:** By mapping violation patterns against geographical data, we identified strong correlations between incident locations and the offenders' area of residence, indicating that most violations occurred during casual, local flights rather than deliberate incursions.

**Knowledge Assessment:** Through post-incident interviews, we evaluated the offenders' understanding of regulations, identifying specific knowledge gaps and misconceptions that contributed to violations.

**Impact Analysis:** Analysis revealed that a more targeted message for residents in estates within no-fly zone that they cannot fly the UA in the area resonates more than just educating on UA regulations.

These data-driven insights enabled us to develop a comprehensive engagement strategy that precisely targeted identified knowledge gaps through multiple touchpoints in the user journey. The implementation plan included:

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### EXTENT OF INNOVATIVENESS

Strategic collaboration with UA retailers to provide point-of-purchase education on UA regulations - especially for new UA users



Picture 1: Photos with UA retailers during engagement

Direct engagement with Citizens' Consultative Committees (CCC) to activate grassroots networks to educate their residents and community on UA no-fly zones and restrictions



Picture 2: Photos of CCC engagement

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#### EXTENT OF INNOVATIVENESS

- Coordinated efforts with government agencies to target specific user groups, including:
  - (i) Peoples' Association (PA) - to help install UA advisory banners and videos on Digital Display Panels to educate residents within 5km of Changi Airport;
  - (ii) Council of Estate Agencies (CEA) - to help raise awareness of UA regulations amongst property agencies and agents, who operate UA frequently as part of their work;
  - (iii) Singapore Tourism Board (STB) - to remind foreign visitors on UA regulations in Singapore;
  - (iv) Land Transport Authority (LTA) - to display advisory posters at transport hubs within 5km of Changi Airport to target commuters in areas of high footfall; and
  - (v) Changi Airport Group (CAG) - to display advisories at Changi Airport so that arriving passengers are informed of local UA regulations.



Picture 3: Photos of outreach collaterals displayed in collaboration with other agencies (CAG, LTA, PA)

- Outreach to other stakeholders including educational institutions - to educate students and staff, who may use UA for academic or recreational purposes, on UA regulations
- Outreach to condominiums, resorts and hotels - to educate the estate management and residents/guests about UA restrictions in their vicinity, particularly those within 5km of Changi Airport

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#### EXTENT OF INNOVATIVENESS

##### Innovation Highlights

The key innovation of this project is the data-analytics approach to enforcement data, and how we transformed the raw information on violations into actionable insights to formulate the "how" and "who" we engage for the targeted outreach. This method has enabled us to develop a deep understanding of UA user patterns and motivations, leading to more effective engagement strategies. This evidence-based approach also marks a shift from traditional outreach methods to a more direct and targeted approach, changing the way we engage with the UA community to promote safety compliance.

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#### IMPACT AND VALUE-CREATION

Our project has delivered substantial tangible benefits, most notably demonstrated by the 28% year-on-year reduction in reported UA incidents. Through targeted engagement strategies, we have established a comprehensive network of stakeholders committed to preventing unauthorised UA operations, while achieving more efficient resource allocation.

The project has also yielded significant intangible benefits. Of note, we have fostered a strong culture of compliance among UA users and strengthened relationships with community stakeholders. Our collaboration with the UA retailers has also established sustainable education channels that reach UA users at crucial touchpoints. This has contributed to improved public awareness and understanding of UA regulations across Singapore.

#### Outcome

The project's data-driven approach has delivered improved results in terms of:

**Economy:** Reduced enforcement and surveillance costs through prevention

**Efficiency:** Targeted outreach initiatives based on data-driven analysis and insights, rather than "blanket" efforts which requires more resources

**Effectiveness:** Significant reduction in number of reported UA incidents

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#### FEASIBILITY AND SCALABILITY

The project demonstrates strong feasibility through its practical implementation and resource-efficient approach. The initiative leverages existing relationships with stakeholders and established communication channels, requiring minimal additional infrastructure or technological investment. The data analytics component utilises readily available enforcement data, making it both cost-effective and sustainable in the long term.

**Geographic Scalability:** The methodology can be expanded beyond the current focus area around Changi Airport to other critical areas in Singapore, including areas around Seletar Airport

**Cross-Domain Application:** The data-driven engagement model can be applied to other aviation safety initiatives, such as kite-flying restrictions, balloon/lantern release, etc.

#### Potential of Project

This project demonstrates immediate practical viability through its successful implementation and measurable results. Its scalability is evidenced by the adaptable framework that can be applied across various domains and no-fly areas. The project's foundation in data analytics and stakeholder engagement provides a robust platform for future expansion and enhancement, making it a sustainable long-term solution for UA safety promotion.