Drones
Integration – not segregation

Andrew Sage, Head of Unmanned Traffic Management (UTM), NATS
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Edinburgh, November 2019
The reality of today’s skies
Drones have consistently accounted for over 50% of Airprox reports since summer 2017.

How much of these incidents are really drones and what does it mean in terms of safety risk?

Excluding AIRPROX reports classified as Drones related.
NATS Drone Safety Dashboard

Reported Incidents by Year-Month

- Year: 2017, 2018, 2019
  - Chart showing incident counts for each year.

Map of incidents with location data available

- Locations: Blackpool, Hull, Manchester, Sheffield, Birmingham, Norwich, Swindon, Newport, Caerphilly, Cardiff, Isle of Man, Southampton, Essex, Isle of Wight.

Density plot of incidents with location data available

- Density heatmap showing concentration of incidents.

Reported Incidents by Flight Level

- Chart showing incident counts by flight level.
A few facts and myths….

Approximately 300,000 drone users in the UK
Over 200 manufacturers of drone passenger vehicles in the world
Commercial applications of drones have yet to emerge
  • Incorrect, Around 6,000 organisations have permission to operate in the UK
You can’t fly a drone within 5km of an airport
  • Incorrect. You can fly but you need approval first
A drone is safe provided it’s under 250g in weight
  • We don’t know for sure but that is the basis of most regulation
Drones are the biggest safety risk to air traffic management
  • Incorrect. They are one of the causes of a growing number of infringements
Manned aviation airspace infringements
Infringements & Drone Reports
Drones – A new pressure on airspace

Over the next two years, we will see the emergence of more valuable commercial applications operating routinely Beyond Visual Line of Sight (BVLOS)

• Remote tracking, telemetry and mission data
• Automated flight path management and monitoring
• Situational awareness on vehicle/ground
• Reversionary procedures

The most commercially valuable operations are often near cities – this means they will typically be close to major airports, airfields and controlled airspace

Flight plans do not follow predictable paths – requires free route principles

Demand is immediate and requires automated and strategic de-confliction

Solutions that work for one-off trials such as temporary danger areas are not sustainable in the long term for repeatable operations
Integration – not segregation
Building the safety case for BVLOS

BVLOS depends upon increased electronic conspicuity of all users

Any increase in situational awareness reduces minimum required capability of airborne vehicle

Safety cases are likely to require increased automation and flight conformance monitoring

The way in which we supervise the airspace will require new flight rules and operational practises
Beyond Visual Line of Sight – how soon?

- First BVLOS safety case
- Commencement of trials
- Sustainable commercial operations
- Drone passenger (certified)
- Drone cargo (certified)
- Long endurance survey (inc HAPs)
- BVLOS VLL urban (eg delivery)
- BVLOS VLL rural/remote (eg inspection)
- Leisure and commercial VLOS

Volumes of commercial drones (UK):
- 2020
- 2025
- 2030
- 2035

76,000 (UK)
Unified Traffic Management (UTM)

Phase 1: Foundation services to build safety culture and public awareness. Drone Assist App now has 130,000 voluntary users.

Phase 2: Implementation of basic UTM services. Protection of controlled airspace and automation of airspace access requests by GA and drones.

Phase 3: The integration of more complex BVLOS drone operations at Very Low Level (VLL) within controlled airspace in a known traffic environment.

Phase 4: The expansion of BVLOS operations outside controlled airspace which will require increased situational awareness and electronic surveillance of all aircraft.

- Education, Awareness, Training, Culture
- Protection of controlled airspace and Airport Flight Restriction Zones
- Safe integration of BVLOS flights into low level controlled airspace
- Implement of EC and airspace management beyond controlled airspace
A world’s first in manned/unmanned user integration

Demonstrating cooperative and uncooperative manned and unmanned aircraft in a variety of scenarios near a busy international airport

Drone position information to other users, improving situational awareness

UTM/ATM interoperability using ATM infrastructure and ATC procedures.

Demonstrate the information flow to and from a UTM system

Including a safeguarding solution for an airport
Sharing the Air #2 – Airspace User Portal

- Currently evaluating Airspace User Portal to automate and route airspace requests
- A single means of gaining access to controlled airspace for ALL users
- Building a single picture of traffic intent
- Providing airspace alerts and situational awareness
- Gives airports access to approved flights and enables informed risk assessments
- Supports enforcement agencies
- We have processed over 2,000 flight requests since April
Mission & business benefit:
Exploit UAS rather than helicopters to inspect offshore platforms. Benefits of quicker deployment and improved safety. 200+ platforms, -100+ unmanned

Airspace management:
Low level airspace; heli route structure and movements are procedural
Pre-flight de-confliction of UAS with known offshore traffic
Flight monitoring and de-confliction with unexpected traffic during flight

Key safety risks:
Exploits low density offshore airspace to minimise risk to other airspace users
Implement temporary restricted airspace for initial trial
Evolving towards dynamic airspace allocation requiring new equipage rules to be seen and to be contactable
Does all this make navigation harder or easier?

**Challenges**
- Varied altitude, inc urban
- Globally standardised
- Cost effective hardware
- Flexible to environment
- Non-certified platforms
- Auditable
- Scalable to many varied users

**Opportunities**
- Signals of opportunity
- Visual detection via the ground
- Flexible mission requirements
- Option to cease flight

Are we returning to a more cognitive means of air navigation in order to reach a safe level of automation?
Keynote takeaways

Airspace capacity is already an issue and airspace infringements are on the rise.
Integration through procedures is the key to safety, not simple prohibition.
BVLOS applications will not be ‘piloted’ – they are likely to be fully automated.
Changes in airspace management and navigation will impact all airspace users.
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