Leveraging UAS in Humanitarian Activities

African Drones Leadership Symposium

29 to 31 October 2018

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Integration of remote technologies in civil aviation – Brings challenges and opportunities
Unmanned aircraft are aircraft

**Aircraft.** *Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth’s surface.*

The flying machine is an aircraft, not a system.
Pilotless Aircraft:

No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without **special authorization** by that State and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to **obviate danger to civil aircraft**.
UA versus RPA

• Unmanned aircraft include:
  • Free balloons
  • Model aircraft
  • Remotely piloted aircraft
    – Airspace/aerodrome integration requires control
    – Control, in real time, provided by a licensed remote pilot
  • “Drones”
RPA vs “Drone"
Two Approaches – Two Streams of Work

- **RPAS**
  - Full regulatory approach

- **Other UAS**
  - ‘Tool Kit’ to enable domestic operations
Operation-centric, risk-based approach
Two Approaches – Two Streams of Work
RPAS - FULL Regulatory Approach

• International IFR operations
• Requirements to initiate international operations:
  • Certificates
  • Airworthiness
  • RPAS Operator
  • Remote pilot licence
Two Approaches – Two Streams of Work

Other UAS
‘Tool Kit’ to enable domestic operations
Other UAS

- **Principles of Aviation Regulation Apply!**
  - Airworthiness
  - Rules of the Air
  - Educated operators and remote pilots
  - Safety management

- **Scaled to level of risk posed to others**
  - Certificate of Airworthiness vs consumer product certification
  - Separation standards vs distance from structures
  - Aviation safety-of-life spectrum vs ???
  - Licence vs operational limitations
  - Risk to third parties: 80,000 kg vs 2 kg
Other UAS

- Toolkit developed by the UAS Advisory Group
  - General guidance for national regulations
  - Best practices and lessons learned from many States
  - Practical examples

- Expanding through DRONE ENABLE
  - Framework for UTM
  - Registration, ID, tracking systems
  - Communications systems
  - Geo-fencing like systems
  - UTM-ATM Interface
RPAS Components and Basic Operations

Remote Pilot

ATC COM

Potential future ATC COM GRD line

Navalits inputs

Aviate

Surveillance

C2 Link

Navalits (incl. SAT)

RPA

Other A/C

ATC

RLOS: 99.99 %

BRLOS: 99.9 %

Meteorological conditions

BRLOS: 99 %

RLOS: 99.99 %
We need to balance humanitarian benefits and safety.
Surveillance
Delivery
Transport of UA to a mission site by air

What do I do about my drone’s lithium batteries?
Lithium batteries - safety concerns

Data shows that existing cargo compartment fire protection systems are unable to suppress or extinguish a fire involving significant quantities of lithium batteries, resulting in reduced time for safe flight to a diversion airport.

International Coordinating Council of Aerospace Industries Associations (ICCAIA)
Lithium Batteries — Hazards

- Ignition source
- Source of fuel for existing fire
- Release of flammable gases creating pressure pulse
- Degree of risk dependent on battery size, density, chemistry, design, manufacturer
Lithium Batteries

• If contained in/packed with drones:
  ☑ Must be transported as cargo (not in baggage)
  ☑ 5 kg limit on passenger aircraft
  ☑ 35 kg limit on cargo aircraft

• If batteries only:
  ☑ FORBIDDEN as cargo on passenger aircraft
  ☑ 35 kg limit on cargo aircraft
Safe Transport of Dangerous Goods by Air

- Annex 18 – *The Safe Transport of Dangerous Goods by Air* - applicable to all international civil aircraft operations and **recommended** for domestic civil aircraft operations
- *Technical Instructions* provide detailed provisions for the safe transport of infectious substances, biological products (including vaccines) and patient specimens....as well as lithium batteries
Drone delivery of blood, vaccines and medical specimens
Public health in civil aviation

Need procedures for public health events in civil aviation...
And what if procedures are not followed or the drone crashes?
Safety Management

• Annex 19 – *Safety Management*, supports the continued evolution of a proactive safety strategy which requires States to implement a State safety programme (SSP), including:
  
  ❑ Developing and maintaining a process to assess safety risks associated with identified hazards;
  ❑ Developing and maintaining a process to manage safety risks; and
  ❑ Requiring operators of aeroplanes or helicopters authorized to conduct *international commercial air transport* to implement a Safety Management System (SMS) in accordance with the framework provided in Appendix 2 to Annex 19.
# Safety Management - SMS Framework

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>ELEMENT</th>
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<td>1. Safety policy and objectives</td>
<td>1.1 Management commitment</td>
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<td>1.2 Safety accountability and responsibilities</td>
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<td>1.3 Appointment of key safety personnel</td>
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<td>1.4 Coordination of emergency response planning</td>
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<td>1.5 SMS documentation</td>
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<td>2. Safety risk management</td>
<td>2.1 Hazard identification</td>
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<td>2.2 Safety risk assessment and mitigation</td>
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<td>3. Safety assurance</td>
<td>3.1 Safety performance monitoring and measurement</td>
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<td>3.2 The management of change</td>
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<td>3.3 Continuous improvement of the SMS</td>
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<tr>
<td>4. Safety promotion</td>
<td>4.1 Training and education</td>
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<tr>
<td></td>
<td>4.2 Safety communication</td>
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- 4 components
- 12 elements
- Commensurate with size and complexity of its services
- Need to address interfaces
Same UA – different applications
Regulators’ challenges
Operational considerations

Obtaining the “Special Authorization” from Civil Aviation Authority (CAA)
• RPAS Operator Certificate
• Certificate of Airworthiness or alternative
• Remote pilot licences
• C2 Link system appropriate for region + radio station licence
• Detect and avoid (DAA) capability
• Airspace (segregated or traffic management)
• Flight planning
• Environmental and meteorological considerations
• Safety Management System – hazard and risk analysis + mitigation plans
• Request for Authorization Form available on the ICAO UAS Toolkit website
KEY POINTS TO REMEMBER
Final thoughts

01  Unmanned industry is evolving at unprecedented pace

02  The complexity of unmanned aviation challenges the traditional aviation regulatory system

03  **Harmonized** performance-based regulations needed to support growth and encourage innovations

04  Regular **information exchange** between States, industry and other stakeholders necessary throughout development process

05  **Harmonized** performance-based regulations are needed to support growth and encourage innovations
THANK YOU