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Leveraging UAS in Humanitarian Activities

10th Global Humanitarian Aviation Conference

23 October 2018

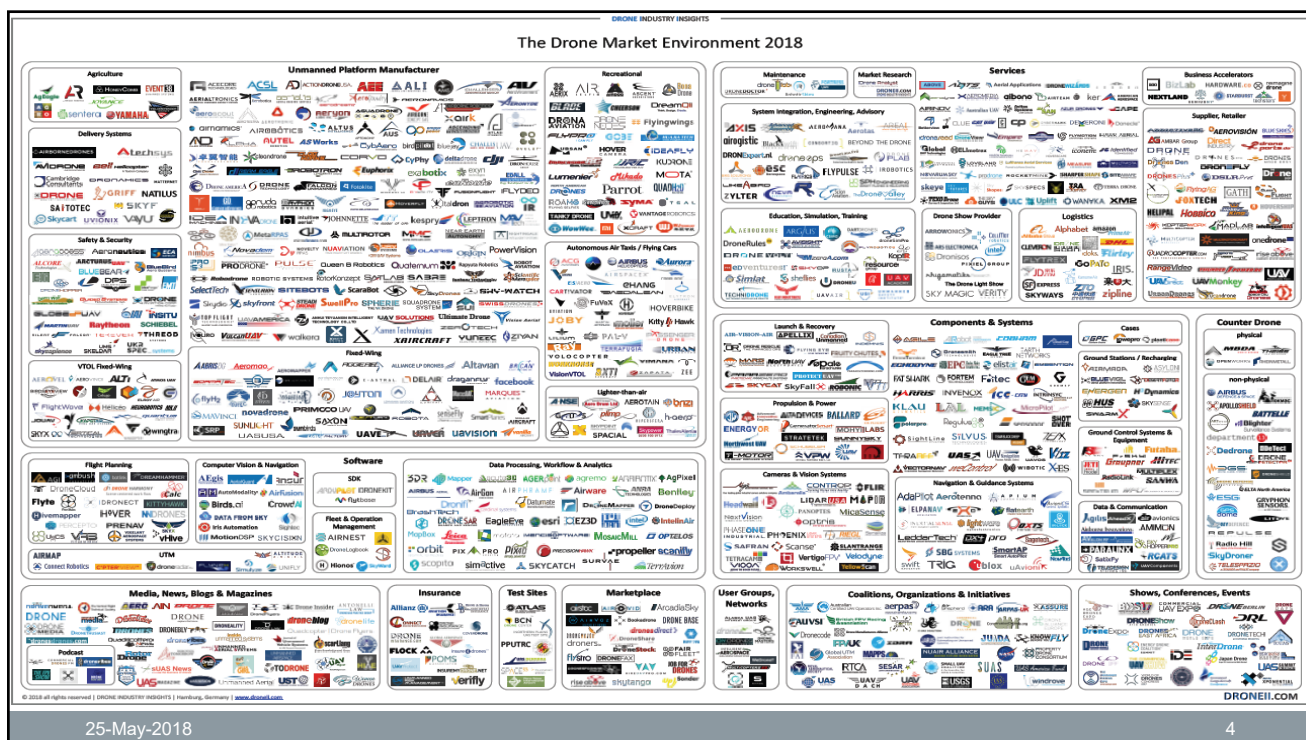
Leslie Cary

Chief, RPAS Section

International Civil Aviation Organization



Aviation is
undergoing a
FUNDAMENTAL
change





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.

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State Obligation

Chicago Convention, Article 8

Pilotless Aircraft:

on board

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**.



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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”



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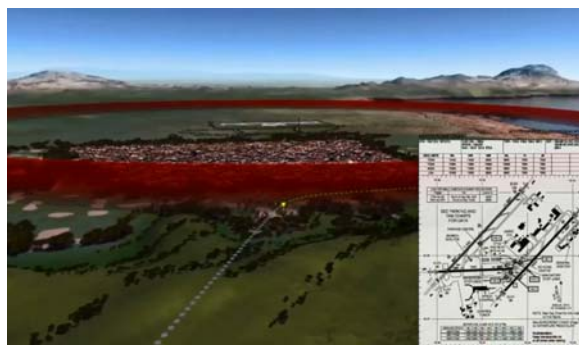
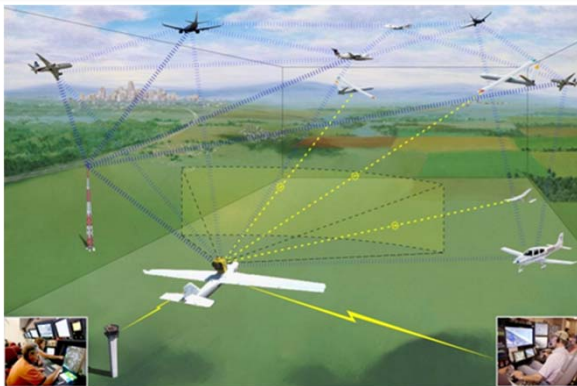
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RPA vs “Drone”

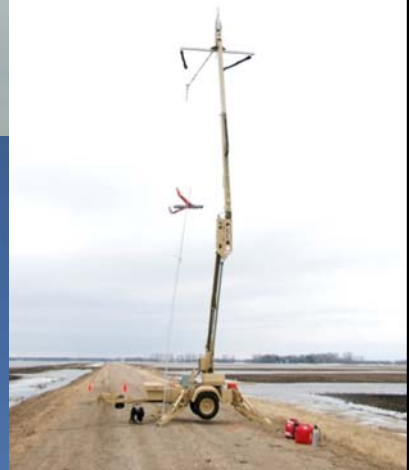


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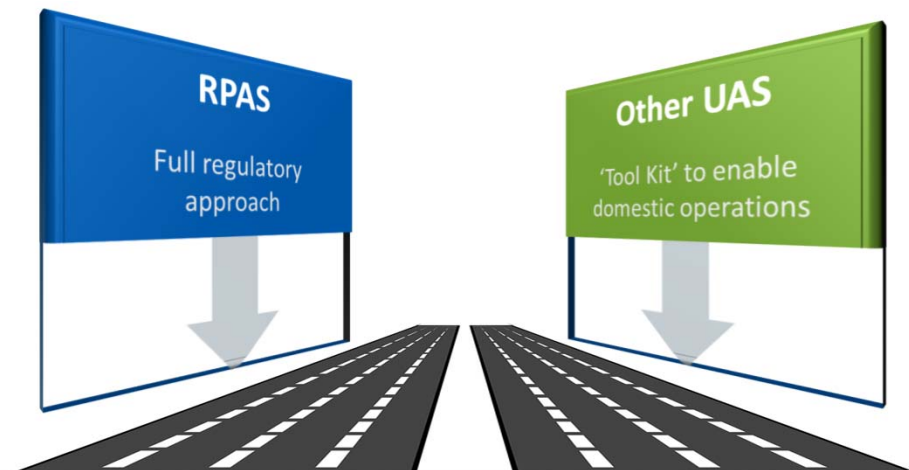
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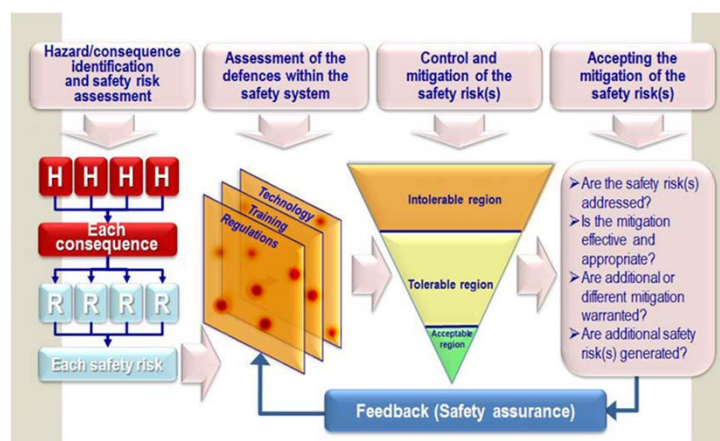
Two Approaches – Two Streams of Work



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Operation-centric, risk-based approach



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Two Approaches – Two Streams of Work



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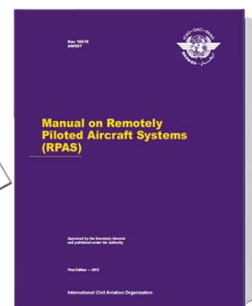
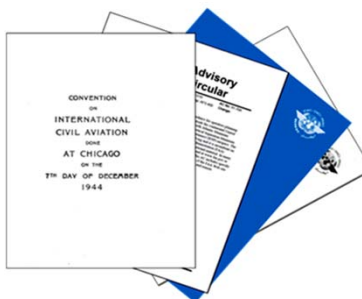


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RPAS - FULL Regulatory Approach

- International IFR operations
- Requirements to initiate international operations:
 - Certificates
 - Airworthiness
 - RPAS Operator
 - Remote pilot licence



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Two Approaches – Two Streams of Work



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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



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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

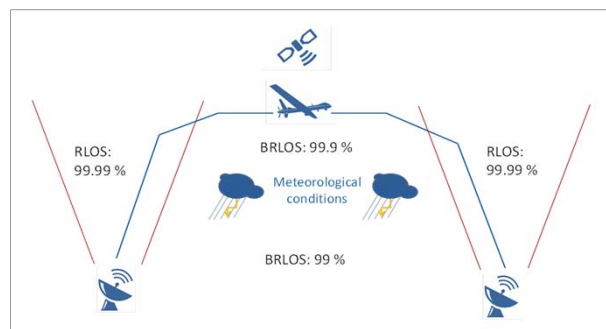
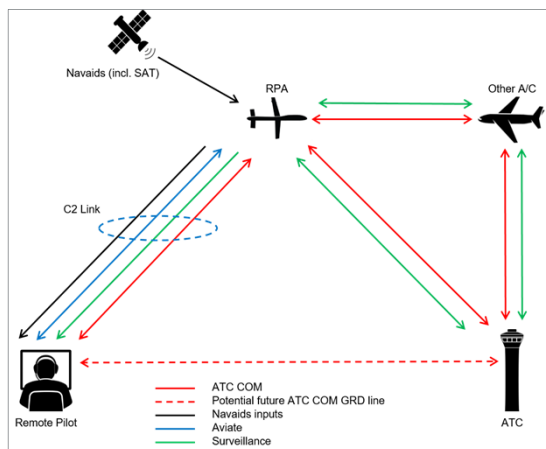


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RPAS Components and Basic Operations



25-May-2018

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Surveillance





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Delivery



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Transport of UA to a mission site by air



**What do I do about my
drone's lithium
batteries?**



Lithium batteries - safety concerns

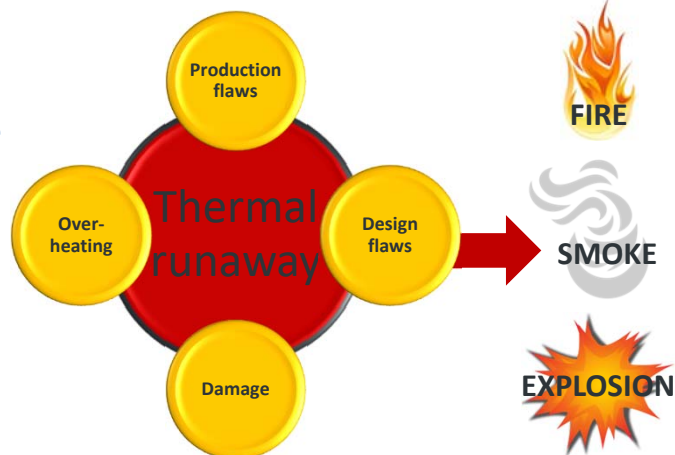
Data shows that existing **cargo compartment fire protection systems** are **unable to suppress or extinguish a fire involving significant quantities of lithium batteries**, resulting in reduced time for safe flight to a diversion airport.

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

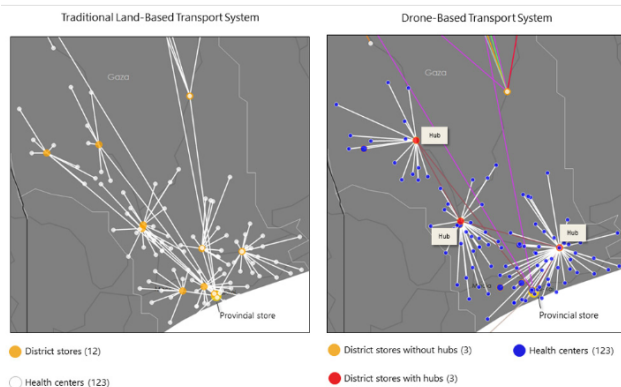


Safe Transport of Dangerous Goods by Air

- 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

New! 2007 IATA 650 Label will replace Diagnostic Specimens Label

If your packaging scheme is in accordance with IATA packaging instruction 650, then one of the following labels should be attached to the outer packaging.

 UN3373 BIOLOGICAL SUBSTANCE CATEGORY B SATA label for Biological Substance, Category B (3 1/2" x 4") Therapack No. 54752 Fisher No. 22130067	 EXEMPT HUMAN SPECIMEN Exempt Human Specimen (2 5/8" x 2") Therapack No. 54814 Fisher No. 22130070	 UN3373 BIOLOGICAL SUBSTANCE CATEGORY B Large IATA label for Biological Substances, Category B (5" x 4") Therapack No. 54782 Fisher No. 22130069
 EXEMPT HUMAN SPECIMEN Exempt Human Specimen (3 5/8" x 1") Therapack No. 54819 Fisher No. 22130071	 EXEMPT ANIMAL SPECIMEN Exempt Animal Specimen (3 5/8" x 1") Therapack No. 54751 Fisher No. 22130066	 BIOHAZARDOUS MATERIAL Biohazardous Material (3" x 2") Therapack No. 54687 Fisher No. 22130118
 FROZEN SPECIMEN Frozen Specimen (2" x 7/8") Therapack No. 54689 Fisher No. 22130119	 DRY ICE SHIPPING Dry Ice Shipping (5 1/2" x 5 1/2") Therapack No. 54558 Fisher No. 22130065	 Double arrow up (3" x 4") Therapack No. 54635 Fisher No. 22130120

Cold chain flow chart



Need procedures for public health events in civil aviation...



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And what if
procedures are not
followed or the
drone crashes?



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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.



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Safety Management - SMS Framework

COMPONENT	ELEMENT
1. Safety policy and objectives	1.1 Management commitment
	1.2 Safety accountability and responsibilities
	1.3 Appointment of key safety personnel
	1.4 Coordination of emergency response planning
	1.5 SMS documentation
2. Safety risk management	2.1 Hazard identification
	2.2 Safety risk assessment and mitigation
3. Safety assurance	3.1 Safety performance monitoring and measurement
	3.2 The management of change
	3.3 Continuous improvement of the SMS
4. Safety promotion	4.1 Training and education
	4.2 Safety communication

- 4 components
- 12 elements
- Commensurate with size and complexity of its services
- Need to address interfaces
- Guidance found in 4th ed *Safety Management Manual* (Doc 9859)



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Same UA – different applications



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ICAO SAFETY Regulators' challenges

The collage illustrates various aspects of drone regulation. It shows a person holding a drone, a drone in flight over a field, and a person operating a drone from a control station. It also includes a 'What Can I Do With My Model Aircraft?' infographic, an 'AGRICULTURE DRONE PERMIT APPLICATION FORM', a 'REMOTE PILOT LOGBOOK', and a 'CIVIL AVIATION REGULATIONS RPAS OPERATOR'S CERTIFICATE - ROC'.

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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 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

