



ALTITUDE
— ANGEL —

Industry Perspective:
BVLOS - The regulatory landscape
and the challenge for routine
operations

21st Nov. 2019



ALTITUDE
AERIAL
ANGEL
VEHICLE

The future of airspace management, today

NO FLY ZONE

AIR AMBULANCE

IS-TONL
HEADING : 070
Alt : 230m
SPEED : 40.7 m/s



**AIRCRAFT ON
FINAL APPROACH**

G-VFAB
HEADING : 090
Alt : 60 m
SPEED : 58.7 m/s

LEISURE FACILITY
PEDESTRIAN HAZARD

POWER STATION
CRITICAL INFRASTRUCTURE

HIGHWAY
TRANSPORT INFRASTRUCTURE

Mike Gadd

Head of International Regulatory Affairs



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Regulatory Landscape

Framework Principles

**INTERNATIONAL
(United Nations)**



INTERNATIONAL CIVIL AVIATION ORGANIZATION
A United Nations Specialized Agency



Convention on International Civil Aviation
RPAS Guidance Manual - Doc. 10019

REGIONAL



Regulation (EU) No. 2018/1139 of
22/08/2018 – The “Basic Regulation”

Certification Specifications
Advisory/Guidance Material

**NATIONAL
(Member States)**



UK – Civil Aviation Act
Air Navigation Order - CAP 393
British Civil Airworthiness Requirements - CAP 553 & 554
Information & Procedures - CAP 562
Specific Guidance - CAP 722

- Initial Airworthiness
- Continuing Airworthiness
- Aircrew
- CS-36 – Noise
- CS-31 – Balloons
- CS-29 – Large Helicopters
- CS-27 – Small Helicopters
- CS-25 – Transport Category Airplanes
- CS-23 – Normal Category Airplanes
- CS-21 – Airworthiness of Products, Parts and Appliances
- CS-19 – Airworthiness of Engines
- CS-17 – Engines
- CS-15 – Engines
- CS-14 – Engines
- CS-13 – Engines
- CS-12 – Engines
- CS-11 – Engines
- CS-10 – Engines
- CS-9 – Engines
- CS-8 – Engines
- CS-7 – Engines
- CS-6 – Engines
- CS-5 – Engines
- CS-4 – Engines
- CS-3 – Engines
- CS-2 – Engines
- CS-1 – Engines
- CS-E – Engines
- CS-FSTD – Simulated Training Devices

Doc 7300/9



**Convention on
International Civil Aviation**

**Convention relative à
l'aviation civile internationale**

**Convenio sobre
Aviación Civil Internacional**

**Конвенция о международной
гражданской авиации**

This document supersedes Doc 7300/8.
Le présent document annule et remplace le Doc 7300/8.
Este documento reemplaza el Doc 7300/8.
Настоящий документ заменяет Doc 7300/8.

Ninth Edition – Neuvième édition – Novena edición – Издание девятое — 2006

International Civil Aviation Organization
Organisation de l'aviation civile internationale
Organización de Aviación Civil Internacional
Международная организация гражданской авиации

Article 1 - The contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its **territory**.

(territory - land areas and territorial waters adjacent thereto under the sovereignty, suzerainty, protection or mandate of such State – Art. 2)

Article 3a - This Convention shall be applicable only to civil aircraft, and shall not be applicable to state aircraft.

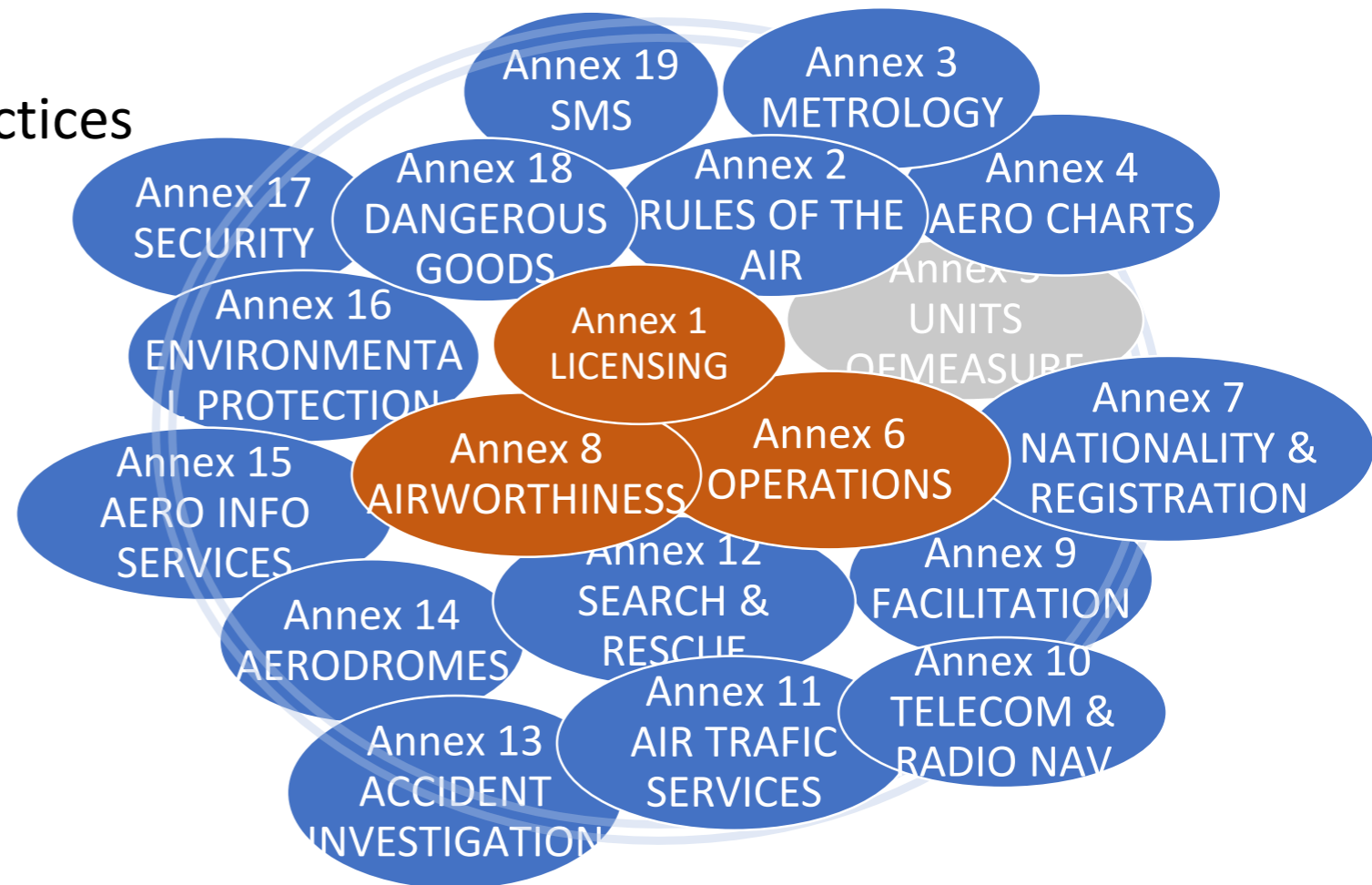
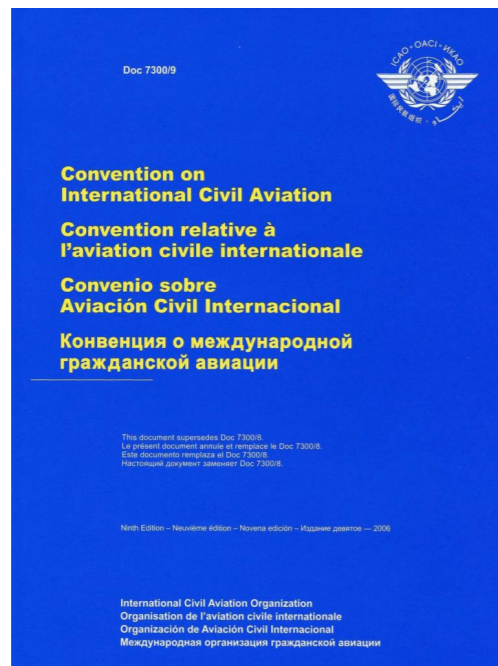
Article 8 - No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft.

GLOBAL REGULATIONS

GLOBAL REGULATION DEVELOPMENT



Standards &
Recommended Practices
(SARPS)



EASA Regulations – UAS (drones) published on 11 June 2019 -

- [Commission Delegated Regulation \(EU\) 2019/945](#)
- [Commission Implementing Regulation \(EU\) 2019/947](#)



OPEN:

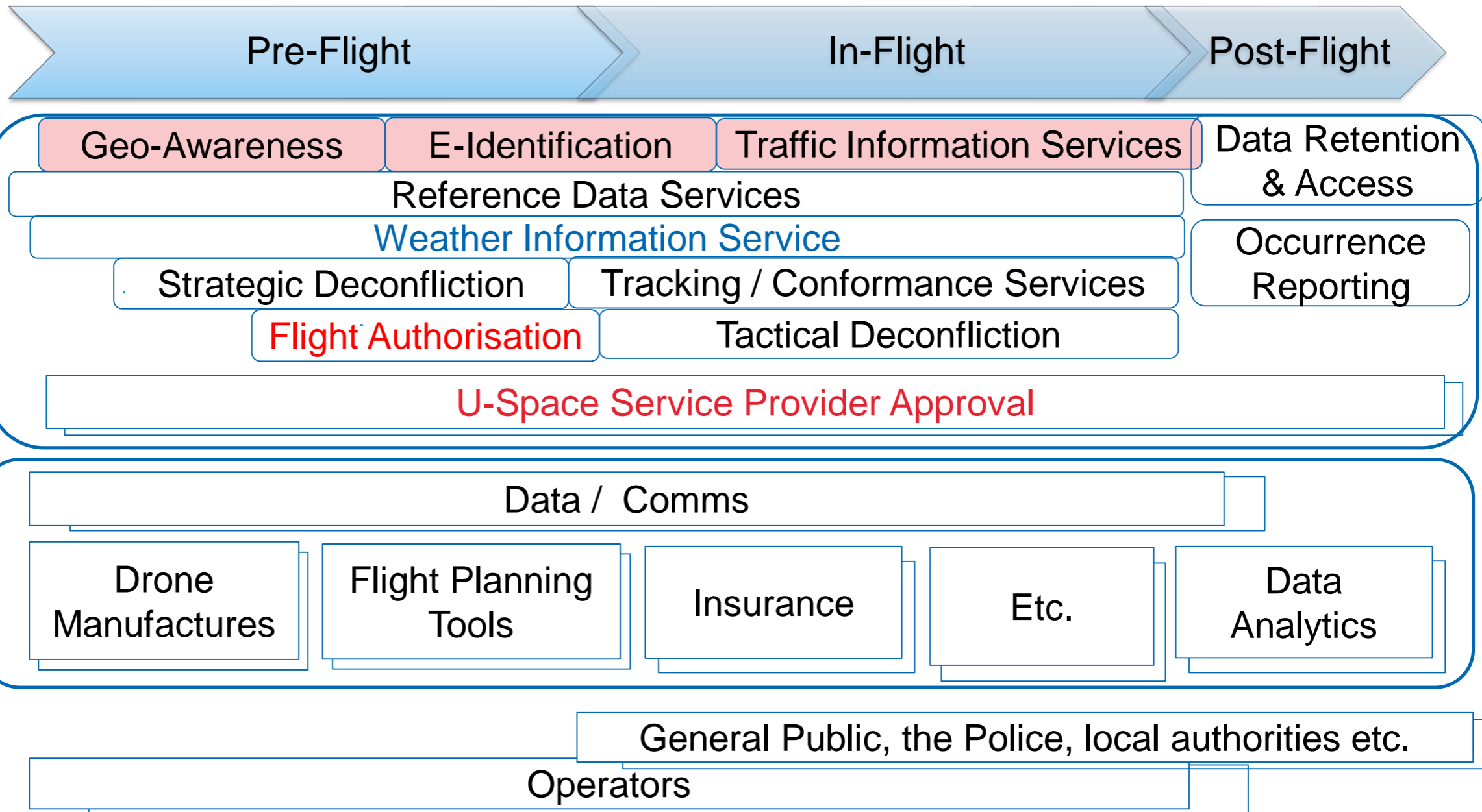
Low risk
 No involvement of Aviation Authority
 Limitations : Visual line of sight, Maximum Altitude, distance from airport and sensitive zones
 Flight over Populated area is possible if:
 -No overflying of crowds
 -Industry standards

SPECIFIC

Increased risk
 Operations Authorisation with operations manual
 Specific qualification of drone, personnel, equipment based on safety assessment

CERTIFIED

Regulatory regime similar to manned aviation
 EASA and Authority Certificates



Regulations - Air Navigation Order (CAP 393)

VLOS:

Art 23 – Exceptions ... for certain classes of aircraft

(Art. 2, 91, 92, 93, 94, 95, 239, 241, 253, 257, 265, 266, 269)

- Art 2 – Interpretation
- Art. 94 (inc A – G) - Small unmanned aircraft requirements
- Art. 95 - Small unmanned surveillance aircraft
- Art 241 - Endangering safety of any person or property

- Registration & Competency (by end Oct '19)
- Electronic Conspicuity

BVLOS:

All Other Articles of then ANO (as CAA determine (case by case) are applicable)

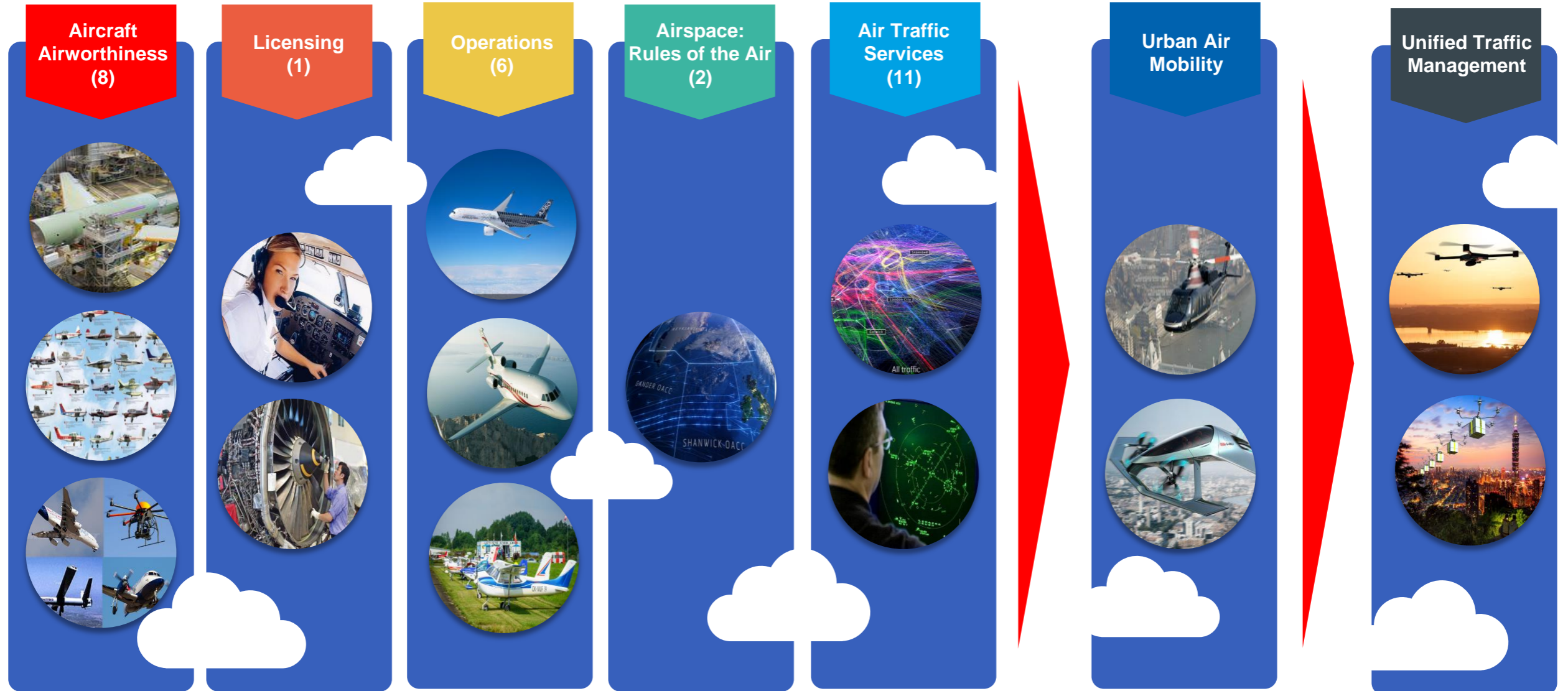
- Permissions
- Exemptions

Guidance –
CAP 722 Ed. 7 plus separate parts A & B

Innovation Hub:

- Innovation Gateway
- Regulatory Sandbox
- Regulatory Lab

Summary





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Challenges For Routine Operations

BVLOS Regulations – Operational Centric Approach

There are NO approvals for UAS focus of the Regulations and is responsible to address all aspects to gain **Permissions** and/or **Exemptions** to the Air Navigation Order

The Operator must address all regulatory compliance, via the use of the Operating Handbook (inc. the Operational Safety Case)

- Aircraft – fitness for flight (airworthiness)
- Pilot Competency
- Operational process/procedures

The variability between operators and uniqueness of many operations means


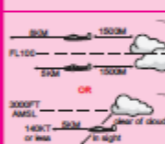
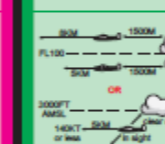

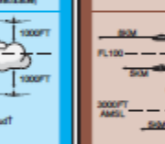
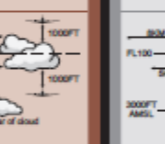
- it can be difficult to define standard arguments
- the assessment process can be very subjective and inconsistent and the approach remains human centric – like ATM this is not scalable for routine volume operations

There is little guidance on:

- What Articles of the ANO need to be addressed –
 - what Permissions are needed
 - what are not / can be Exempted
- Key objective is to show the operation is Safe (Safe Enough) – Air and Ground Risks – but there is little information on the appropriate Target Level of Safety (TLoS) that needs to be substantiated.

However, whatever the TLOS, I would suggest 3 key aspects must be addressed in support of BVLOS:

- **Position Awareness** (X, Y and Z dimensions)
 - Where is it, how is it position determined/obtained, how precise/accurate is it?
- **Situation Awareness**
 - How to know about external aspects could compromise safety, e.g. other aircraft or hazards, and appropriate actions to take ?
- **Command and Control capability**
 - How is command & control achieved legally and at distances operated ?
 - Is it available at the operating locations ?
- Automation and reliance on data exchange/sharing and how to address this.

UK ATS AIRSPACE CLASSIFICATIONS							
Civil Aviation Authority		CONTROLLED AIRSPACE				OUTSIDE CONTROLLED AIRSPACE	
	A	C	D	E	F	G	
I F R	ATC SEPARATION PROVIDED	IFR ↔ IFR	IFR ↔ IFR VFR SVFR‡	IFR ↔ IFR SVFR‡	IFR ↔ IFR	IFR ↔ IFR	
	TRAFFIC INFORMATION PROVIDED			IFR ATC VFR <small>(Air traffic avoidance advice only - CTR)</small>	IFR ATC IFR <small>(where practicable)</small>	IFR ATC IFR <small>(where practicable)</small>	
	SPEED LIMITATION	Not applicable (unless notified for ATC purposes)	Not applicable (unless notified for ATC purposes)	below FL100 250 KIAS	below FL100 250 KIAS	below FL100 250 KIAS	
	RADIO	Headset icon	Headset icon	Headset icon	Headset icon	Headset icon	
	ATC CLEARANCE REQUIRED?	YES	YES	YES	YES	YES	
V F R	ATC SEPARATION PROVIDED	VFR FLIGHT NOT PERMITTED SVFR AVAILABLE IN CTRs	VFR SVFR‡ ↔ IFR SVFR‡	SVFR ↔ IFR SVFR‡	Not provided	Not provided	
	TRAFFIC INFORMATION PROVIDED		VFR ATC VFR	VFR ATC IFR <small>(where practicable)</small>	IFR ATC IFR <small>(where practicable)</small>	IFR ATC IFR <small>(where practicable)</small>	
	VMC MINIMA						
	SPEED LIMITATION	VFR FLIGHT NOT PERMITTED SVFR AVAILABLE IN CTRs	below FL100 250 KIAS	below FL100 250 KIAS	below FL100 250 KIAS	below FL100 250 KIAS	below FL100 250 KIAS
	RADIO	Headset icon	Headset icon	Headset icon	Not required	Not required	
	ATC CLEARANCE REQUIRED?	NO	YES	YES	NO	NO	

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250 KIAS Not applicable to military aircraft

‡ Helicopters may fly at or below 3000FT AMSL, clear of cloud with the surface in sight and a flight visibility of at least 1500 metres.

‡ SVFR in CTR only.

NOTE: Air Navigation Order 2005 Schedule 8 UK PPL and NPPL license privileges apply.

* Aircraft (except helicopters) at 140KIAS or less: clear of cloud with the surface in sight in a flight visibility of at least 1500 metres. Helicopters at a speed which, having regard to the visibility is reasonable: clear of cloud with the surface in sight in a flight visibility of at least 1500 metres.

CORUS:
ConOps proposal - Three Airspaces types are proposed:

- X: No conflict resolution or separation service is offered
- Y: Pre-flight conflict resolution is offered only
- Z: Pre-flight conflict resolution and in-flight separation are offered