

UAS OPERATIONS IN UK AIRSPACE

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Scope

- **CAA's Approach to Unmanned Aircraft System Operations**
- **Key Aspects of the UAS 'challenges' and the link to ASTRAEA**
- **Public Perception Issues – How ASTRAEA can help**
- **The next steps?**

UK CAA's Approach

High Level Regulatory Policy

Internationally Shared View

(UK, EASA, FAA, ICAO, other NAAs)

The existing aviation legislation is designed to enable the safe and efficient operation of manned aircraft in all classes of airspace.

Evolved through time as experience has been gained (or lessons learned)

Unmanned Aircraft Systems must work within the existing regulatory framework or an adaptation that achieves the same level of safety (Equivalence).

Some aspects of this will not be possible until the industry develops solutions to the technical issues

Fundamental Principles

- **They are Aircraft** – not ‘drones’ ‘toys’ ‘UAVs’ etc
- **They are Piloted** – albeit remotely
- **Equivalence** – to manned aviation (level of compliance)
- **No ‘automatic rights’** - to airspace or special privileges
- **Transparency** – to ATC
- **Operate within the bounds of existing legislation**

General Considerations

- **‘Pilot in Command’ Responsibilities**
- **Pilot ‘separated’ from aircraft**
 - **Avoidance of collisions/Lookout principles**
 - **Airworthiness**
 - **Integrity of ‘link’ to aircraft**
 - **Complex Flight Control Systems**

Airspace Challenges for UAS



- **Airspace types/classifications**
 - **Different Access permissions**
 - **Flight Rules – VFR/IFR**
- **ATC Cannot monitor all UA**
 - **radar coverage**
 - **workload**
 - **uncontrolled airspace aspects**
 - **cannot track ‘small’ a/c**

UAS Ops Within UK Airspace

- **Visual Line of Sight (VLOS)**
 - ‘See and Avoid’ responsibilities through visual observation (visually managed)
 - Limited range- Size/Colour, weather conditions
 - 500m horiz, 400ft vert
- **Beyond Visual Line of Sight (BVLOS)**
 - Detect/Sense and Avoid System
 - Segregated Airspace (if no DS&A system fitted)

UAS Segregation

- **UK uses Danger Areas as prime tool for UA segregation purposes**
 - UA flight not considered inherently dangerous
 - Activity demands an enhanced level of protection both to, and from, other airspace users
- **Short term needs may be catered for through temporary airspace restrictions - TDA**
- **But....Segregation denies airspace to other users**

Detect/Sense and Avoid

- **Generic expression used to reflect a technical capability commensurate with a pilot's ability to 'see and avoid' other air traffic and hazards**
 - **Detect and Avoid – ICAO terminology**
 - **Not 'just' Collision Avoidance**
 - **Needs to work in 'Real Time'**
 - **'On Board' sensor(s)**
 - **Ground Based sensors**
 - **Combination of both?**

‘Detect and Avoid’ must enable the pilot of an Unmanned Aircraft to:

- **Separation**
 - perform the same ‘give way’/’maintain sufficient distance so as not to cause a hazard’ roles undertaken by the pilot of a manned a/c iaw the Rules of the Air
- **Collision Avoidance**
 - Undertake collision avoidance manoeuvres (ie. ‘last ditch’ avoidance) if the normal separation provision fails
 - ‘Automatic’ system also required (Eg. If control link is lost)

Rules Of The Air

Converging
flight paths



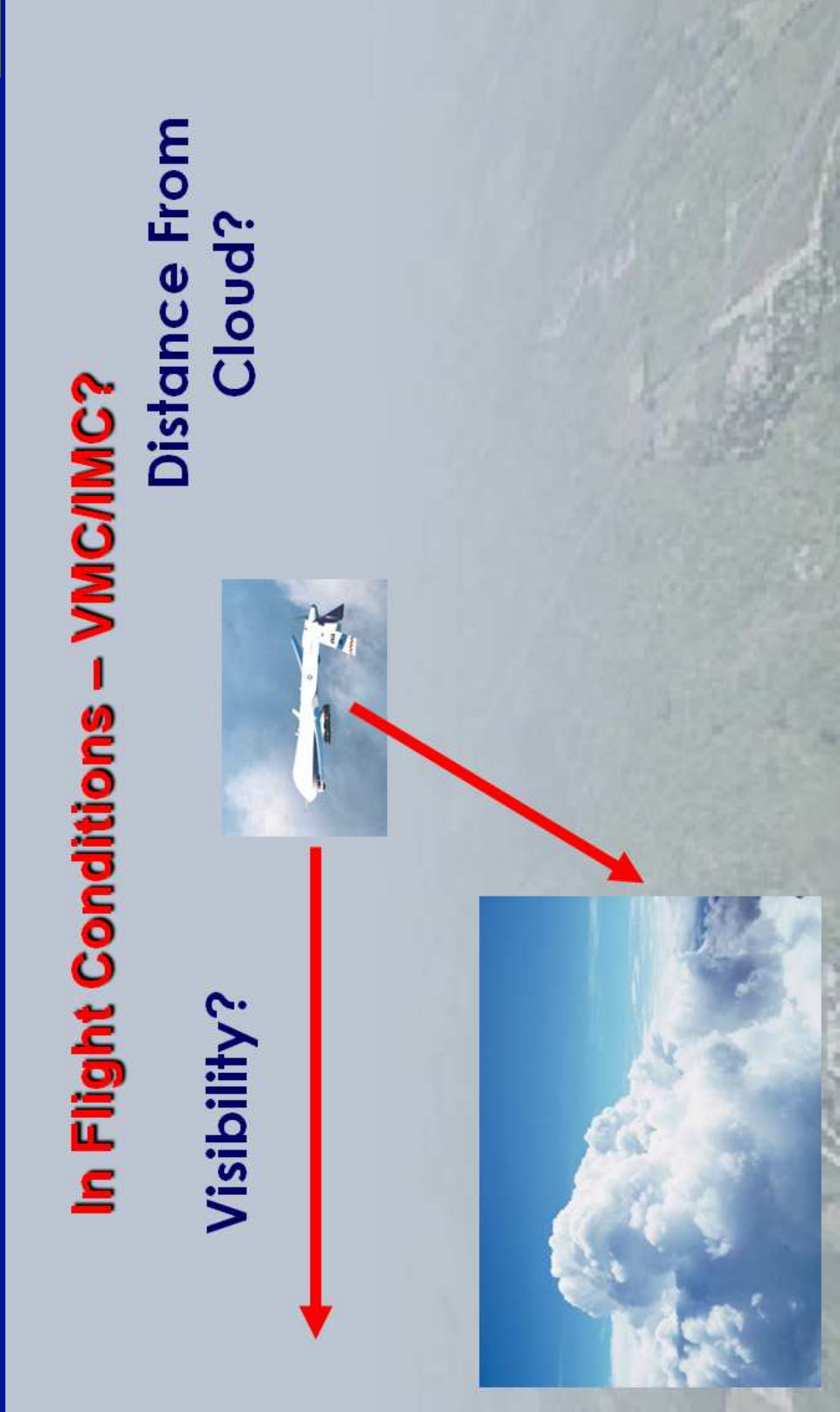
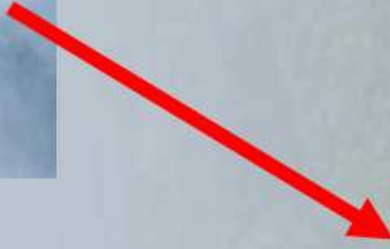
Giving way

(implies recognition of aircraft category)

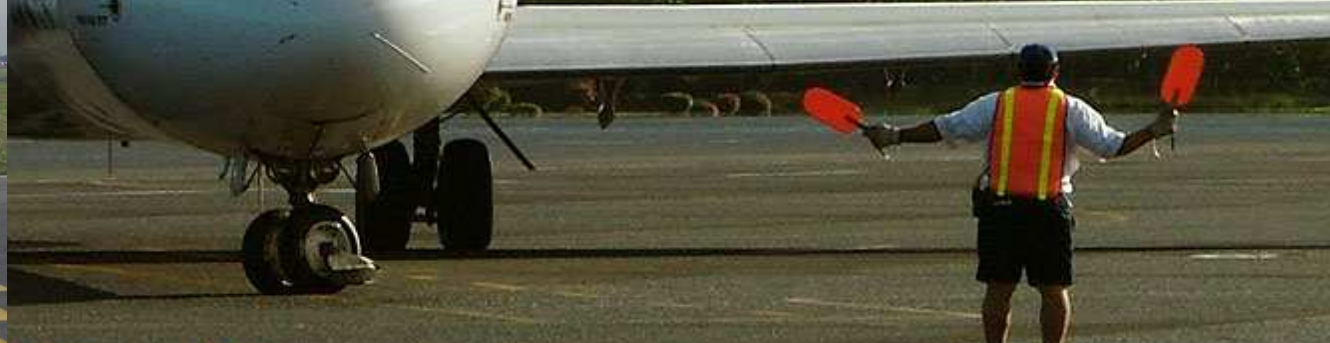
In Flight Conditions – VMC/IMC?

Distance From
Cloud?

Visibility?



...and ultimately....
How will a UA/RPA interact with these?



Certification Challenges

The challenges of UAS certification

- **UAS certification will be new & novel**
- **UAS must be safe to fly over the UK landmass**
- **UAS specific Certification Specifications still being developed - to some extent, we are going into the unknown**
- **However, the ASTRAEA Virtual Certification programme will allow us to work through the problem areas first**

The 'STAR WARS' analogy



+



A Jet Ranger

A pilot

The 'STAR WARS' analogy

Now then,
remove
the...



and add...



...a Robot (Synthetic) Pilot

The 'STAR WARS' analogy

...and we
have

...a UAS!



The 'STAR WARS' analogy

- **In this case the Jet Ranger is still a Jet Ranger.**
- **It is still certificated to FAR-27.**
- **On its own, like any other aircraft, it is still just a collection of bits screwed together**
- **and like the manned pilot, it is the Robot (Synthetic) Pilot that enables this aircraft to fly**

The CAA Certification approach

- **CAA is taking the ‘Synthetic Pilot’ approach to UAS certification (ie. the special bit is the bit that ‘used to be’ just the pilot)**
- **Airframe systems are considered separately from the Synthetic Pilot, (the Complex Flight Control System)**
- **This approach is being tested/validated through the Virtual Certification with ASTRAEA**
 - **BAe 31 = ‘known’ airframe = no change**
 - **What are the differences/additions that enable it to fly Unmanned/Remotely Piloted ?**

Public Perception

What we (the public) hear.....

- **Drones/Killer Drones**
- **Spy in the Sky**
- **Big Brother**
- **Military use only**
- **Safety concerns – ‘no pilot = no control’**

- **Industry still needs to paint a more positive picture of the UAS potential – ASTRAEA’s wide ranging consortium members can do much to spread the word and highlight the potential benefits from UAS use**

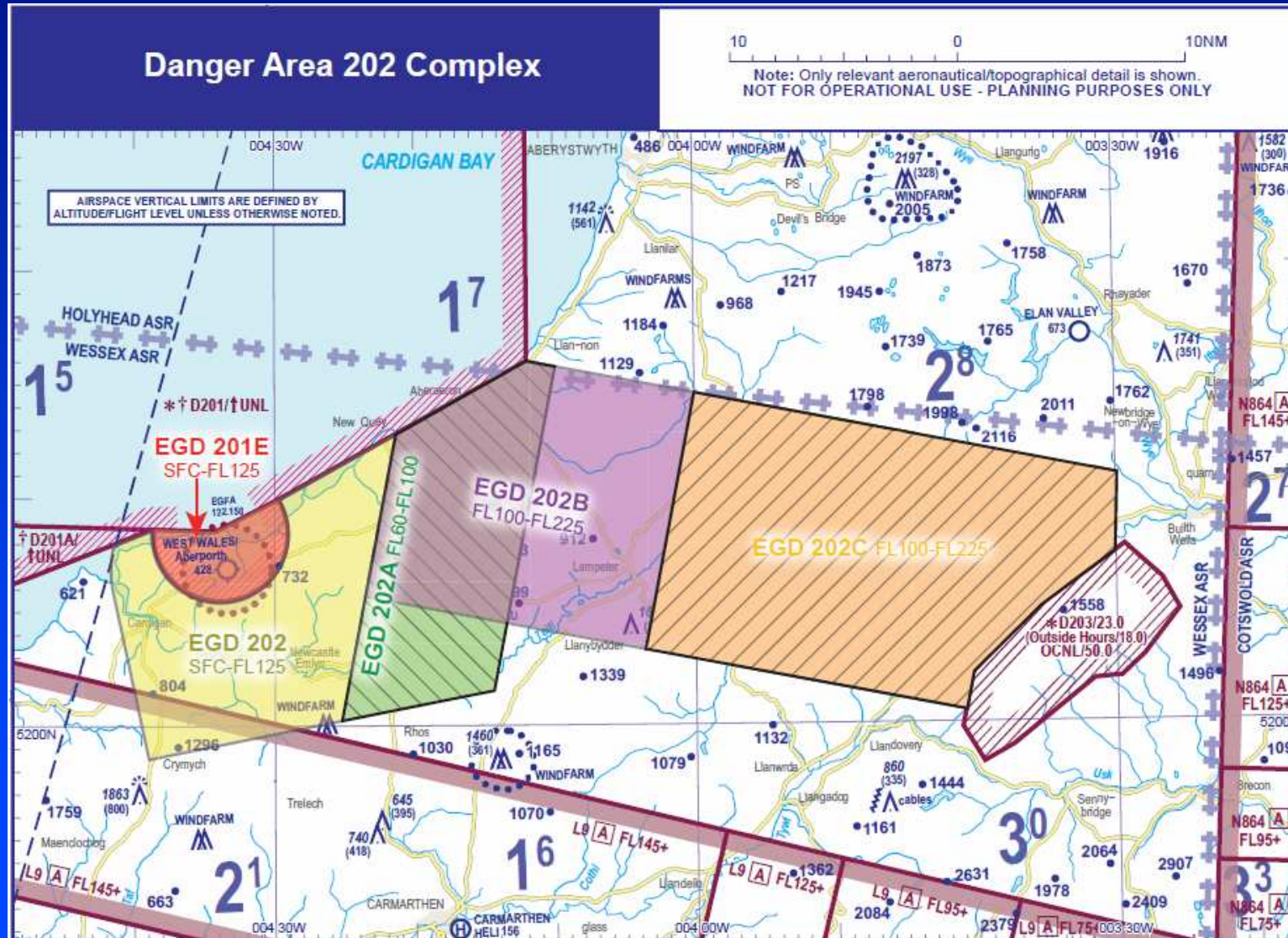
Next Steps Toward Integration?

- **Step-by-Step expansion of operations:**
 - Visual Line of sight – below 400 ft / 500m range
 - In segregated airspace over sterile surface
 - In segregated airspace – surface may be populated
 - In segregated - ‘managed’ interaction with manned aircraft
 - Airspace and overflight as for manned aircraft

Small UAS Operations

- **UK Air Navigation Order 2009 (1 Jan 10)**
- **ANO Art 166/167 (plus 'endangerment' Art 138)**
 - **Permission required from CAA for:
Aerial Work, flight close to people/property**
 - **Specific aim "to protect those not involved in the activity"**
- **Small UAS Currently the biggest/most notable development area (Police, Fire, 'security', Aerial Phot Surveys)**
 - **Over 75 Small UAS operators currently flying in UK**

Wales UAS Environment



Progress Within ICAO

- **UASSG**
- **ICAO Circular – published Dec 10**
- **Guidance Doc being developed (for early 2013)**
 - **Airworthiness**
 - **Detect and Avoid**
 - **Crew Licensing**
 - **Command, Control, Comms**

To Sum Up

- **As for manned aircraft, unmanned aircraft will only be permitted to operate in UK airspace if it is considered that it is safe for them to do so**
- **‘Safe to be Flown’ - Airworthiness/Cert = ASTRAEA**
- **‘Flown Safely’ – Detect and Avoid = ASTRAEA**
- **Once this has been achieved, Unmanned Aircraft will be afforded the same access rights as all other aircraft (in accordance with the aircraft and the airspace classification)**