Workshop on Copernicus

and

High Altitude Unmanned Platforms (HAPS)

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Topics

- Definition of HAPS
- Legal definition of HAPS
- Regulatory Consequences

HAPS Definition

- R.R.: High altitude pseudo-satellites (HAPS) are defined as **objects** located at an altitude of 18 to 50 km and over a specified, nominal, fixed point relative to the Earth.*
- ICAO noted that HAPS are designed **to deliver** various communication services over a wide area without the need for ground infrastructure.**
- ESA said that HAPS: '**are platforms** that float or fly at high altitude like conventional **aircraft** but operate more **like satellites'**.***
- Operators: 'High Altitude Pseudo-Satellite (HAPS) that fills a capability gap between **satellites** and **UASs**'.****

Are these definitions sufficient to identify the applicable regulation to make this service safe, marketable and insurable?

Do these definitions consent to understand which is the law applicable to HAPS? Air or space law?

- From a legal point of view the answer is crystal clear: NO
- Without a specific and shared legal definition the creation of a legal frameworks, HAPS are neither marketable nor insurable.

* No. 1.66A of the Radio Regulations.
** ICAO POSITION FOR THE INTERNATIONAL TELECOMMUNICATION UNION (ITU) WORLD RADIOCOMMUNICATION CONFERENCE 2019 (WRC-19).
*** http://www.esa.int/Our_Activities/Navigation/Crossing_drones_with_satellites_ESA_eyes_high-altitude_aerial_platforms
**** https://www.airbus.com/defence/uav/zephyr.html

Towards a legal definition of HAPS: are they aircraft or satellites?

'HAPS are **aircraft** positioned at or above 18 km altitude (i.e. FL 600), in the stratosphere, for very-long-duration flights counted in weeks and even months. These unmanned aircraft may be airplanes, airships or balloons'.*

How do they reach this conclusion without an official definition yet issued by competent bodies?

- Perhaps taking into consideration the **main characteristics of HAPS** and the **space** (altitude) **where they fly**.

Are they right?

- To answer this question, other two questions deserve a reply:
  - **How aircraft is defined**? and
  - **What is the difference between airspace and outer space**?

*https://business.esa.int/funding/invitation-to-tender/services-enabled-high-altitude-pseudo-satellites-haps-complemented-satellites

HAPS characteristics

In order to reply, first of all the main characteristics of HAPS have to be identified:

HAPS are:

- positioned above 18 km altitude in the **stratosphere**;
- capable to perform **very-long-duration flights** (able to fly for months at a time);
- running exclusively on **solar power**;
- **controlled** from **Ground Control Stations** anywhere in the world;
- able to **take-off or land** without runway or airport;
- lifted by aerodynamic forces generated by a fixed wing or floating, supported by aerostatic forces.

Are HAPS aicraft or satellites?

- **Definition of Aircraft** → *'An aircraft is 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.' (ICAO Annex 8)*
- **Definition of Satellite / Space Object** → it concerns any man-made objects which is at least attempted to be physically brought into **outer space** (the Convention on International Liability for Damage Caused by Space Objects 1972 does not define it).

Hence, from a technical point of view, they are clearly aircraft as per Annex 8 to the Chicago Convention, regardless of the altitude but, in order to establish the application of the two regimes, i.e. air and space law, the delimitation of the **outer space** is **essential**.

Consequently, the boundary between **airspace** and **outer space** is of fundamental importance and one of the relevant element to establish it, is the altitude where they fly.

Airspace or Outer Space

- **Definition of outer space** → the space **up to 100 km maximum** in line with the Karman line, where there is no possibility to perform aeronautical flight (i.e. lifted by reactions of the air).

- As a consequence, any craft flying above 100 km can be defined as **space objects** while under this altitude - if lifted by reactions of the air - would and should **not be qualified as space objects** (under the presumption of a 100 km boundary).

- Consequently, aeroplanes, airships or balloons, manned or unmanned, flying below 100 km should be considered as beloning to **cathegory of aircraft.**

- Conversely rockets (e.g. Ariane), in light of their characteristics and the space where they fly, **are not aircraft.**

HAPS Legal Definition

Are these definitions satisfactory in order to define HAPS?

- YES, because the ICAO's Aircraft definition is so wide to encompass **each machine capable of sustained flight** regardless of lifting devices, but with the essential capability to be controllable and lifted by reactions o the air.
- At this point it could be objected that also satellites could be considered as aircraft, since they are able to transport but the difference lays **on the space** where the satellites ultimately fly, namely in the outer space, well above 100 km.
- In conclusion, **HAPS are aircraft**, usually **unmanned airships** or aeroplanes positioned above 18 km.
- In addition, because they fly without a pilot on board **they are unmanned aircraft – UAS** (Annex 7 to Chicago Conv.).
- **HAPS** could be encompassed in the **'certified' category** which is a category of UA operation that, considering the risks involved and the safety requirements, needs the certification of the UAS, a licensed remote pilot and an operator approved by the competent authority, in order to ensure an appropriate level of safety.

Aircraft Definition Consequences

- **Identified their Nature**: they could be **civil aircraft or State aircraft** (e.g. the Global Hawks is considered as state aircraft when used by military services - Article 3 of the Chicago Convention 1944).
- **Applicability of safety regulation for UAS**: Regulation 1139/2018 (EASA Basic Regulation) applies to UAS for airworthiness, certification, registration, remote pilot licence, etc. in the 'certified category'.
- **Civil liability and Insurance**: Basic Regulation No 1139/2018, provides only for essential safety requirements for unmanned aircraft.
- **Lack of rules** for **civil liability** and **insurance** requirements still persists.

Lack of Regulation for Civil Liability and Insurance

- **CIVIL LIABILITY**: If an accident caused by an HAPS on the surface or to other aircraft (because of a **crash** or because of **a collision** with other aircraft in fly) it is of fundamental importance to establish the liability regime.

- **Three** essential elements have to be clarified to establish it:

  - Who will be **responsible**?
  - How will the damaged party **be compensated** (and, before that, for what kind of **damage**)?
  - In **which jurisdiction** will be possible to bring an action against the liable party?

- There is no doubt that, in the absence of a European regulation, it would be difficult to identify - the **liable party** and, even if identified - the process to obtain **compensation for victims** could be lengthy and complex, with consequent difficulties in finding a suitable insurance coverage and rapid market development of HAPS.

Applicable Regulation

- The reasonable solution is to refer to the **existing set of rules for manned aircraft** such as:
  - the Rome Convention 1952 on third party liability and
  - Regulation 785/2004 on compulsory insurance of the operator.

- Rome Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface (1952):

  - **attributes** the liability for damage to third parties on the operator;
  - the operator's liability is not fault based (negligence or wilful misconduct), because he is **strictly liable**;
  - includes a **limitation scheme of compensation** for accident, based on the weight of the aircraft that caused the damage.

- Regulation 785/2004, in respect of liability for third parties, introduces the **minimum compulsory insurance cover** per accident, for each and every aircraft, which is calculated in reason of the Maximum Take Off Mass 'MTOM'.

Regulation for Civil Liability and Insurance

- In the light of the mentioned regulations:

Who will be responsible for damage to the third party on the surface?

- The **aircraft operator** is the person who was making use of the HAPS at the time the damage. The **registered owner** of the HAPS shall be presumed to be the **operator** and shall be liable as such unless, in the proceedings for the determination of his liability, he proves that some other person was the operator (article 2 Rome Conv.) (the remote pilot in command is responsible for the violation of the rules of the air and under criminal law).

How will the damaged party be compensated (and, before that, for which damage)?

- The compensation mechanism of Rome Convention based on the MTOM **is not suitable** for determining the debt limitation and should be **designed expressly for HAPS** (the kinetic energy as an alternative criterion?)

In which jurisdiction will be possible to bring an action against the liable party?

- The one of the State where the damage occurred (art. 20 Rome C.). Considering the **complexity of HAPS** (aircraft in the air and ground infrastructure/station), a clear identification of the applicable jurisdiction may avoid uncertainties in the case of accidents occurring outside the country where the ground station is based.

Conclusions

- The Rome Convention's principles are very familiar to Member States*.
- Since the principles in common with the Rome Convention are already applied by Member States, they could become principles characterising a future European regulation for a third-party liability regime for UASs.

How would it be possible to reach this result?

- An example is offered by Italy, which, in compliance with Annex 7 of the Chicago Convention, has:

1. **enlarged the definition of aircraft as far as to include drones;**
2. **established that liability for damage on the surface** caused by an aircraft - which includes also drones - is subject to international law in force in Italy (i.e. the Rome Convention);
3. **increased the limitation scheme** up to the minimum requirements established by European Regulation No 785/2004, which establishes the minimum insurance cover per accident, for each and every aircraft;
4. **provided a compulsory liability system** for unmanned aircraft applying Regulation 785/2004 on insurance coverage.

*Most of them have ratified various international conventions on civil liability for damage to third parties. It can be recalled, for example, the International Convention on Civil Liability for Oil Pollution Damage (CLC), the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND), or the Vienna Convention on Civil liability for Nuclear Damage.

Thank you!

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