It is getting more and more busy up there

- **Space operations**: 10-100s
- **Very High Level operations (VHL)**: 10,000s
- **IFR/VFR operations**: 100-1000s
- **Very Low Level operations (VLL)**: 10,000,000s

Global estimates 2020-2025
Impact on ATM: just one example!

2014: Around 1000 drone activities measured within the Hamburg CTR due to software update in a single day!

Source - DFS
Problem statement

- RPAS are
  - Affecting current aviation traffic
  - Creating new traffic
  - Interacting with population at a larger scale than current aviation

- Other new airspace users have the same kind of impact (Suborbital)

- A dedicated Air Traffic Management CONOPS is required to
  - *Pave the way* to future procedures and regulations
  - *Foster RPAS activity* whilst providing adequate safety levels for airspace users and ground third parties
  - * Guarantee that the current airspace users* will be impacted only if absolutely necessary
Integration requirements for RPAS:

4 conditions

- The integration of RPAS shall not imply a significant impact on the current users of the airspace;

- RPAS shall comply with existing and future aviation regulations and procedures;

- RPAS integration shall not compromise existing aviation safety levels nor increase risk: the way RPAS operations are conducted shall be equivalent to that of manned aircraft, as much as possible;

- RPAS specifics must be transparent to ATC and other airspace users
EUROCONTROL RPAS ATM CONOPS

- Is **flexible**: it is independent from continuously evolving scenarios
- Is **generic**: it addresses any RPAS category or technology
- Is **operationally oriented**: it provides an operational ATM perspective based on areas of operations
- Is opening the door to **standardized contingency procedures**
- Is **based** on the following logic:
  - Area of operation
  - **Class of RPAS traffic**
    - Class of airspace
    - Category of RPAS (from EASA CONOPS)

- CONOPS – a visionary document, not an implementation plan
- CONOPS is a living document
- RPAS ATM CONOPS Final version (4.0) available online

[Link to CONOPS document](http://www.eurocontrol.int/publications/remotely-piloted-aircraft-systems-rpas-atm-concept-operations-conops)
Areas of operations as used in this CONOPS

- **AGL**
  - Space operations

- **100 km / 62 Miles**
  - Very High Level operations (VHL)

- **FL 600**
  - IFR/VFR operations

- **500 ft**
  - Very Low Level operations (VLL)

- **0 ft**
What is a “Class of RPAS traffic”?  

As RPAS are very difficult to categorise due to the large variety of shapes, sizes, performance and operations; different traffic classes have been developed to support the management of large numbers of RPAS operations.

A “Class of RPAS traffic” is a set of flying rules, operational procedures and system capabilities applicable to:
- the RPAS
- to the RPAS operator when operating the RPAS in a portion of the airspace.
- to the Services applicable in that airspace
Assumptions

- The rules of the air will not be adapted for low level RPAS operations at this altitude, thereby maintaining the 500ft boundary as implemented around the world already.
- A dedicated supporting RPAS low level ATM management system is required. Relying on the mobile phone network to reduce the implementation costs is an option.
- A C2 service is provided.
- “Detect and avoid” and self separation capability is implemented.
- The State has executed an airspace assessment, defining where RPAS can operate and where not. Geo-fencing is in place.
- RPAS have tracking capability.
4 RPAS Classes of traffic

- Class I: Reserved for RPAS EASA cat A (VLOS only);
- Class II: Free route (VLOS and BVLOS);
- Class III: Organized commercial medium/long haul traffic (BVLOS);
- Class IV: Special operations (this category of RPAS traffic conducts very specific types of operation that will be assessed on a case by case basis. (VLOS and BVLOS).
Class I traffic

Class I traffic:

- Primarily advanced “buy and fly” RPAS, in areas of low traffic density with the following requirements:
  - Mandatory declaration of operation
  - Capability to self-separate in 3D
  - VLOS only
  - Geofencing capabilities to ensure separation from No-Drone Zones (NDZ)
**Class II traffic**

**Class II traffic:**
- Operates in free flight due to type of operations (surveys, filming, search & rescue and any operation with no fixed-route structure) with the following requirements:
  - Mandatory authorization for operation
  - Self-separation in 3D capability
  - Surveillance capability
  - Free flight capability
  - VLOS & BVLOS
  - Barometric measurement equipage for BVLOS operations
Class III traffic

Class III traffic:

- Operates in BVLOS only and mainly for transport operations. Can operate in free flight or route structure-based depending on airspace assessment with the following requirements:

  - Mandatory authorization for operation
  - Surveillance capability
  - Free flight or route structure capability
  - BVLOS only
  - Barometric measurement equipage
Class IV traffic

Category is designed for highly specialised operations and as such not many of these types RPAS are expected. Operations can be civil, state or military with the following requirements:

- Require special authorisation;
- Should be addressed on case by case basis;
- Could require tracking capability;
- Must be able to remain clear of all other traffic;
- May have priority on manned aviation depending on the mission type.
Operational options supported by the RPAS classes

Increasing traffic
2 RPAS Classes of traffic

**Class V:**
- Class V is IFR/VFR operations outside the Network not flying SIDs and STARs. In this environment, RPAS not meeting Network performance requirements will be able to operate without negatively impacting manned aviation. Operations at airports will be accommodated through segregation of launch and recovery.

**Class VI:**
- Class VI is IFR operations, including Network, TMA and Airport operations with RPAS capable of flying SIDs and STARs as designed for manned operations. These are either manned transport aircraft enabled to fly unmanned with similar capabilities or new types able to meet the set performance requirements for the Network, TMA and airports.
**Class V traffic**

**Class V traffic:**

- VFR/IFR operations outside the network not flying SID and STAR with the following requirements:
  - Flight plan mandatory;
  - RPAS has to meet airspace CNS requirements
  - Ability for the RPAS to establish 2 ways communications with ATC
  - RPAS has to remain clear of manned aircraft
  - RPAS operator ability to contact ATC in case of:
    - C2 loss
    - Emergency
    - Controlled termination of flight
  - Detect & Avoid capability compatible and cooperative with ACAS
### Class VI traffic

**Class VI traffic:**

- IFR operations only including Network, Airport, TMA with capability to fly SID and STAR as designed for manned operations with the following requirements:
  - Flight plan mandatory;
  - RPAS has to meet all airspace performance requirements;
  - Ability for the RPAS to establish 2 ways communications with ATC;
  - RPAS has to remain clear of manned aircraft;
  - RPAS operator ability to contact ATC in case of:
    - C2 loss
    - Emergency
    - Controlled termination of flight
  - Detect & Avoid capability compatible and cooperative with ACAS
Subcategory of IFR operations → Class VII

Very High Level Operations (VHL)

- Suborbital unmanned flights operating at altitudes above FL 600 will be growing fast in numbers as private companies have projects to use that upper airspace. Business range goes from Telecommunication service to space tourism.
- No VFR is anticipated because of high speed or low manoeuvrability of the vehicles.

Class VII:

- Class VII consists solely of IFR operations above FL600 and transiting in non-segregated airspace.
- The launch and recovery of fixed-wing RPAS can be from dedicated airports and outside congested airspace.
Class VII Traffic

Class VII traffic:

- The launch and recovery of fixed-wing RPAS can be from dedicated airports and outside congested airspace.
- Solely IFR operations above FL600 and transiting in non-segregated airspace with following requirements:
  - Flight plan mandatory
  - RPAS has to meet all airspace CNS performance requirements
  - RPAS must inform ATC if emergency re-entry in controlled airspace
  - RPAS must inform ATC about contingency procedures (balloon deflating/orbiting descent…)
  - A regional system keeps overview on on-going operations
This robust CONOPS is ready and takes in account:

- The operational evolution
- The technology evolution

Very Large scale demonstrations are still needed to go to validation

An airspace assessment for 0 – 500ft has to be performed on:
- Risk analysis
- CNS availability

RPAS CNS equipage will be a key driver for safe operations and integration

EUROCONTROL RPAS CONOPS is a living document and not an implementation plan