



Welcome to the High Level Conference on Drones





PANEL 2b

Remote pilot-in-command responsibilities and shared operational responsibilities

March 22, 2023 | 11:15 – 12:45



Giuseppe SCANNAPIECO

Drones Project Manager
Certified category



Rita SOUSA-UVA

EASA Senior Legal Adviser



Rob AKRON-PUNSELIE

Vice Chairman Workgroup UAS+
Vereinigung Cockpit
European Cockpit Association



Alexandra FLORIN

Wing Aviation Technical
Standards Manager



Lt. Col. Oliver HORZ

German Military Aviation Authority
Flight Operations Principles Section
Staff Officer – RPAS Operations



Technical Workshop 2b

REMOTE PILOT-IN-COMMAND RESPONSIBILITIES SHARED OPERATIONAL RESPONSIBILITY

Moderator: **Giuseppe SCANNAPIECO**
Drones Project Manager – Certified category

Amsterdam, 22.03.2023



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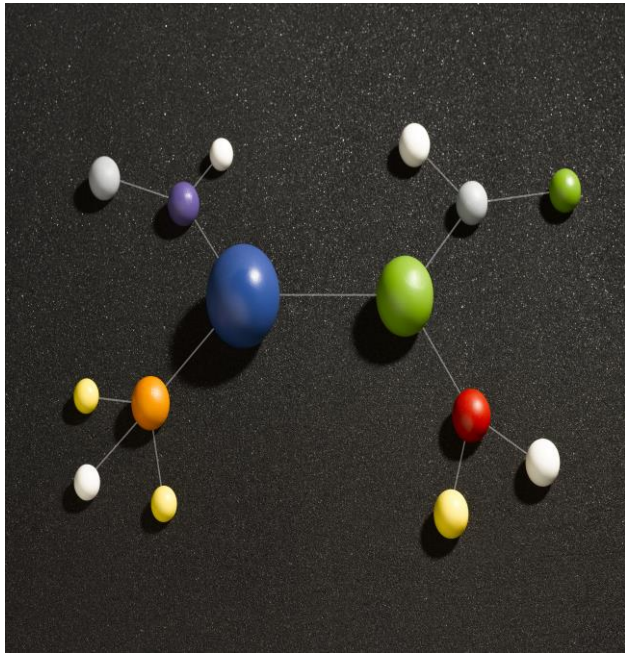
Technical Workshop 2b

Remote pilot-in-command role and responsibilities

Panellist: **Rita SOUSA-UVA**
EASA Senior Legal Adviser



Setting the scene



- Definition & concept of the Pilot-In-Command (PIC)
- Associated duties & responsibilities
- Current regulatory framework for the operation of Unmanned Aircraft Systems (UAS)

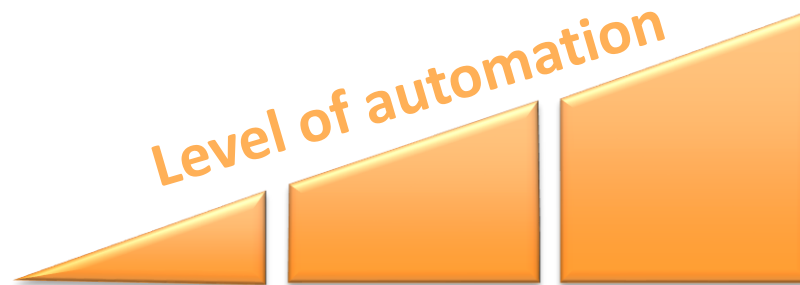
The remote pilot

A natural person responsible for safely conducting the flight of an unmanned aircraft by operating its flight controls, either manually or, when the unmanned aircraft flies automatically, by monitoring its course and remaining able to intervene and change the course at any time

Article 3(31) of Regulation 2018/1139 and Article 3(27) of Regulation 2019/945

HUMAN-IN-COMMAND CONOPS

Instantaneous
trajectory control



Achievement of an
objective through
automatic manoeuvres

Assumptions

a human is always in command, autonomous operations are excluded

the remote pilot may control one Unmanned Aircraft (UA) at a time, or control simultaneously several UA, also of different types and from different operators

handover of control of an UA between different Command Units and between different remote pilots is possible

the handover of command is not considered

Actors & responsibilities in UAS operations

Different actors, different responsibilities,
running in parallel

manufacturer

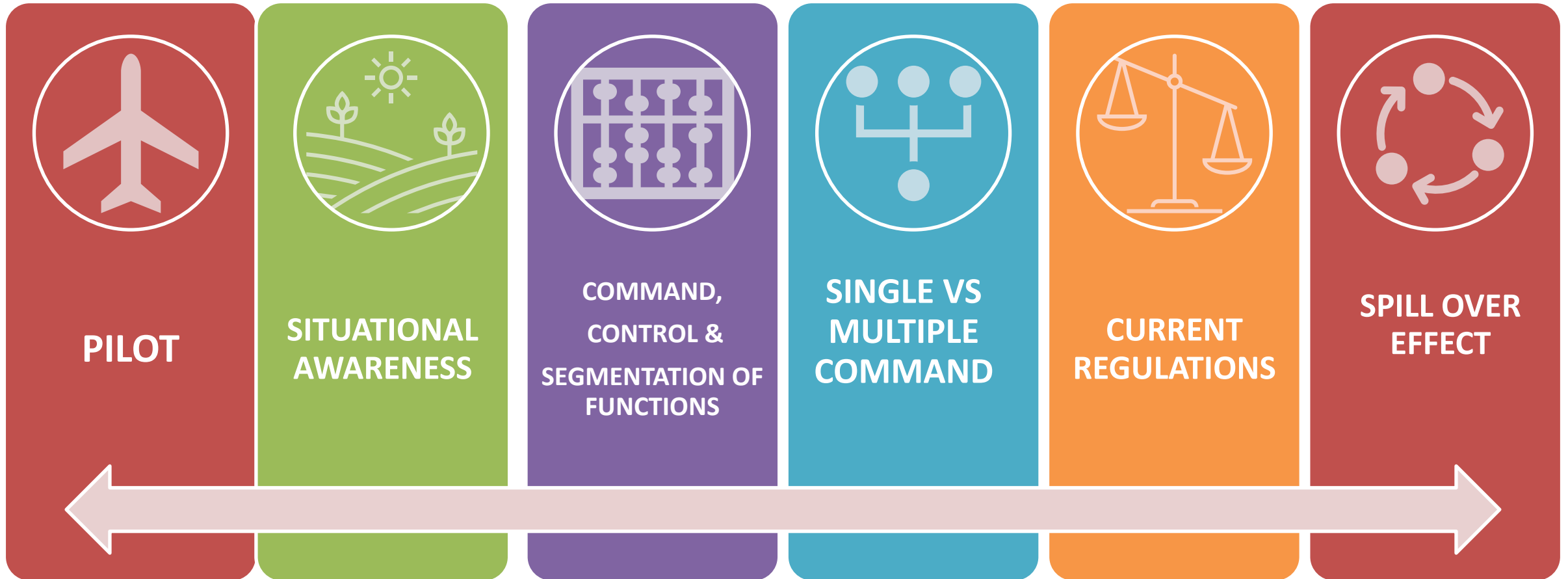
operator

owner

remote pilot

*remote crew**

REGULATORY CLUSTERS



Definitions (1/2)

Term	Definition	Reference
'Pilot in command'	The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.	ICAO Annex 2, Chapter 1, Definitions and Annex 6, Chapter 1, Definitions
'Remote pilot-in-command'	The remote pilot designated by the operator as being in command and charged with the safe conduct of a flight.	ICAO Manual of Remotely Piloted Aircraft Systems (ICAO Doc 10019)
'Remote pilot'	A person charged by the operator with duties essential to the operation of a remotely piloted aircraft and who manipulates the flight controls, as appropriate, during flight time	ICAO Manual of Remotely Piloted Aircraft Systems (ICAO Doc 10019)
'Responsibility of pilot-in-command'	The pilot-in-command of an aircraft shall, whether manipulating the controls or not, be responsible for the operation of the aircraft in accordance with the rules of the air, except that the pilot-in-command may depart from these rules in circumstances that render such departure absolutely necessary in the interests of safety.	ICAO Annex 2, Chapter 2, Article 2.3.1
'Authority of the pilot-in-command'	The pilot-in-command of an aircraft shall have final authority as to the disposition of the aircraft while in command	ICAO Annex 2, Chapter 2, Article 2.4
'Duties of the Pilot-in-Command'	The pilot-in-command shall be responsible for the safety of all crew members, passengers and cargo on board when the doors are closed. The pilot-in-command shall also be responsible for the operation and safety of the aeroplane from the moment the aeroplane is ready to move for the purpose of taking off until the moment it finally comes to rest at the end of the flight and the engine(s) used as primary propulsion units are shut down. [...] further specific duties are contained in other sections of Article 4.5	ICAO, Annex 6, Vol I, Article 4.5

Definitions (2/2)

Term	Definition	Reference
'Designation of the pilot-in-command'	The aircraft operator must designate one pilot amongst the flight crew as the pilot in command.	Article 8.6 of Annex V to Regulation 2018/1139
'Pilot in command'	Means the pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight	Article 2(100) of Regulation 965/2012
	Means the pilot designated as being in command and charged with the safe conduct of the flight. For the purpose of commercial air transport operations, the 'pilot-in-command' shall be termed the 'commander'	Article (96) of Annex I – Definitions of Regulation 965/2012
	Means the pilot designated as being in command and charged with the safe conduct of the flight	Article FCL.010 of Regulation (EU) No 1178/2011
'Responsibility of pilot-in-command'	In an emergency situation, which endangers the operation or the safety of the aircraft and/or persons on board, the pilot in command must take any action he/she considers necessary in the interest of safety. [...]	Article 7.3 of Annex V to Regulation 2018/1139
'Authority of the pilot-in-command'	The pilot in command must have the authority to give all commands and take any appropriate actions for the purpose of securing the operation and the safety of the aircraft and of persons and/or property carried therein	Article 7.2 of Annex V to Regulation 2018/1139
'Remote pilot'	A natural person responsible for safely conducting the flight of an unmanned aircraft by operating its flight controls, either manually or, when the unmanned aircraft flies automatically, by monitoring its course and remaining able to intervene and change the course at any time	Article 3(31) of Regulation 2018/1139 and Article 3(27) of Regulation 2019/945
'Remote pilot-in-command'	TO BE DEFINED	---

Terminology: is there a need for definitions in hard law?

Term	Definition
Role	The function, position or tasks that and individual person has been allocated with by the organisation
Responsibility	A set of duties or obligations associated with the assigned role
Task	A specific work assigned or done as part of one's professional duties
Command	The authority vested in an individual for the direction, coordination and control of functions and tasks required for a flight operation. Such authority may be exercised either directly by executing the flight operation, or by directing other individuals/organizations involved in the flight operation
Control	The management and execution of functions and tasks required for a flight operation consistent with a command authority
Automation*	The use of control systems and information technologies reducing the need for human input, typically for repetitive tasks
Autonomy*	The ability to perform tasks in complex environments without input by a human

*From the "EASA Artificial Intelligence Roadmap v1.0"

To sum up... more questions than answers!

How important is the pilot?

Is the increased automation leading to a shift in the distribution of responsibilities?

Is there an increased liability of the manufacturer?

Where does the pilot stop and when does the computer take over?

Can we benefit from military experience and mindset?

Thank you for your undivided attention...

The fun starts now😊!

easa.europa.eu/connect



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Technical Workshop 2b

European Cockpit Association Position on remote pilot operations

Panellist: **Rob AKRON-PUNSELIE**
Vice Chairman Workgroup UAS+
Vereinigung Cockpit
European Cockpit Association





About us

“ The European Cockpit Association represents the collective interests of professional pilots at European level, striving for the highest levels of aviation safety and fostering social rights and quality employment. ”

The European Cockpit Association (ECA) was created in 1991 and is the representative body of European pilots at European Union (EU) level. It represents over 40,000 European pilots from the National pilot Associations in 33 European states. In addition, ECA has 3 Associate Members.



ECA Piloting Safety
European Cockpit Association

*Joint call to safely integrate Drones / UAS into
Europe's Airspace*



Joint call to safely integrate Drones / UAS into Europe's Airspace

“ The Signatories of the Statement want to support the effort of the European regulator to produce a robust harmonized EU-wide regulatory safety framework for drones. At the same time, in this Joint Statement, the sector parties A4E, ACI EUROPE, ATCEUC, CANSO, EBAA, ECA, EHA, EHAC, ERAA, ETF, IACA, IAOPA, IATA, IFALPA, IFATCA, and IFATSEA express their serious concern about the safety of manned aircraft in controlled and uncontrolled airspace. ”

“ The signatories emphasize the importance to ensure compatibility with the ongoing work at ICAO level. ”



Table 2. UAS Automation Levels

Level	Name	Definition	Management of flight		Management of flight Fallback	ODD (Operational Design Domain)
			Lateral, longitudinal and vertical control	OEDR (Object and Event Detection and Response)		
0	No automation	Controlled by the Pilot-in-Command during the entire operation, even when enhanced by active safety systems.	Pilot-in-Command	Pilot-in-Command	Pilot-in-Command	Limited
1	Pilot assistance	The sustained and ODD-specific execution by a flight automation system of either the lateral, the longitudinal or vertical vehicle motion control subtask, but not simultaneously, with the expectation that the Pilot-in-Command performs the remainder of the management of flight.	Pilot and system	Pilot-in-Command	Pilot-in-Command	Limited
2	Partial automation	The sustained and ODD-specific execution by a flight automation system of the lateral, longitudinal and vertical vehicle motion control subtasks of the management of flight with the expectation that the pilot completes the OEDR subtask and supervises the flight automation system.	System	Pilot-in-Command	Pilot-in-Command	Limited

3	Conditional automation	The sustained and ODD-specific performance by an AFS of the entire management of flight with the expectation that the fallback-ready Pilot-in-Command is receptive to AFS-issued requests to intervene, as well as to management of flight performance-relevant system failures in other aircraft systems, and will respond appropriately.	System	System	Pilot-in-Command	Limited
4	High automation	The sustained and ODD-specific performance by an AFS of the entire management of flight and management of flight fallback without any expectation that a mission commander will respond to a request to intervene.	System	System	System Mission-Commander with aviation knowledge/skills	Limited
5	Full automation	The sustained and unconditional (i.e., not ODD-specific) performance by an AFS of the entire management of flight and management of flight fallback without any expectation that a mission commander will respond to a request to intervene.	System	System	System Mission-Commander	Unlimited

A competent human must always be *in command*

“ Based upon the SAE J3016 levels of driving automation¹ ECA distinguishes six levels of automation. From Automation-Level 0 to 3 there must be a *Pilot-in-Command* with traditional piloting-skills. For Automation Level 4 to 5 there must be a *Mission Commander* with the appropriate skills and competencies. For level 4 this includes airmanship-skills. ”

“ Up to Level 3, the human being is the fallback option in the event of failures/ problems, and thus the human being in these levels still needs "classic manual flying skills". The ECA refers to this person as "Pilot-in-command" for these levels.

While Levels 4 and 5 no longer require a “pilot”, a human still retains the command authority. This authority is limited to the parameters (e.g. technical, regulatory, legal) of the respective mission to be flown. Hence the ECA expert-group refers to this individual as a “Mission-commander”. ”

“ A competent human must always be *in command* ”




More information:

https://www.eurocockpit.be/positions

Expertise


UAS+

APPLY



Specific Operations Risk Assessment (SORA)


SORA (Specific Operations Risk Assessment) is a **multi-stage process of risk assessment** aiming at risk analysis of certain unmanned aircraft operations, as well as defining necessary mitigations and operational safety objectives and their required level of robustness.



Unmanned Aircraft Systems and the concepts of Automation and Autonomy


The current safety levels of manned aviation commercial operations must not be negatively impacted by the introduction of future highly automated and/or autonomous systems. They must be at least equaled or improved.

Apr 30, 2020



Joint call to safely integrate drones into Europe's airspace

The Signatories of the Statement want to support the effort of the European regulator to produce a robust harmonized EU-wide regulatory safety framework for drones. At the same time, in this Joint Statement, the sector parties A4E, ACI EUROPE, ATCEUC, CANSO, EBAA, ECA, EHA, EHAC, ERAA, ETF



The RPAS 'Open Category' in EASA's Concept of Operations for Drones

This paper describes the position of Europe's professional pilots on the standards and rules necessary for the safe use of drones in EASA's 'Open' category. Acknowledging the potential this technology has for innovation and benefit to society, it is absolutely critical that the technology

Jul 24, 2015

Contact: rob.akron@vcockpit.de





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Drone delivery in shared skies

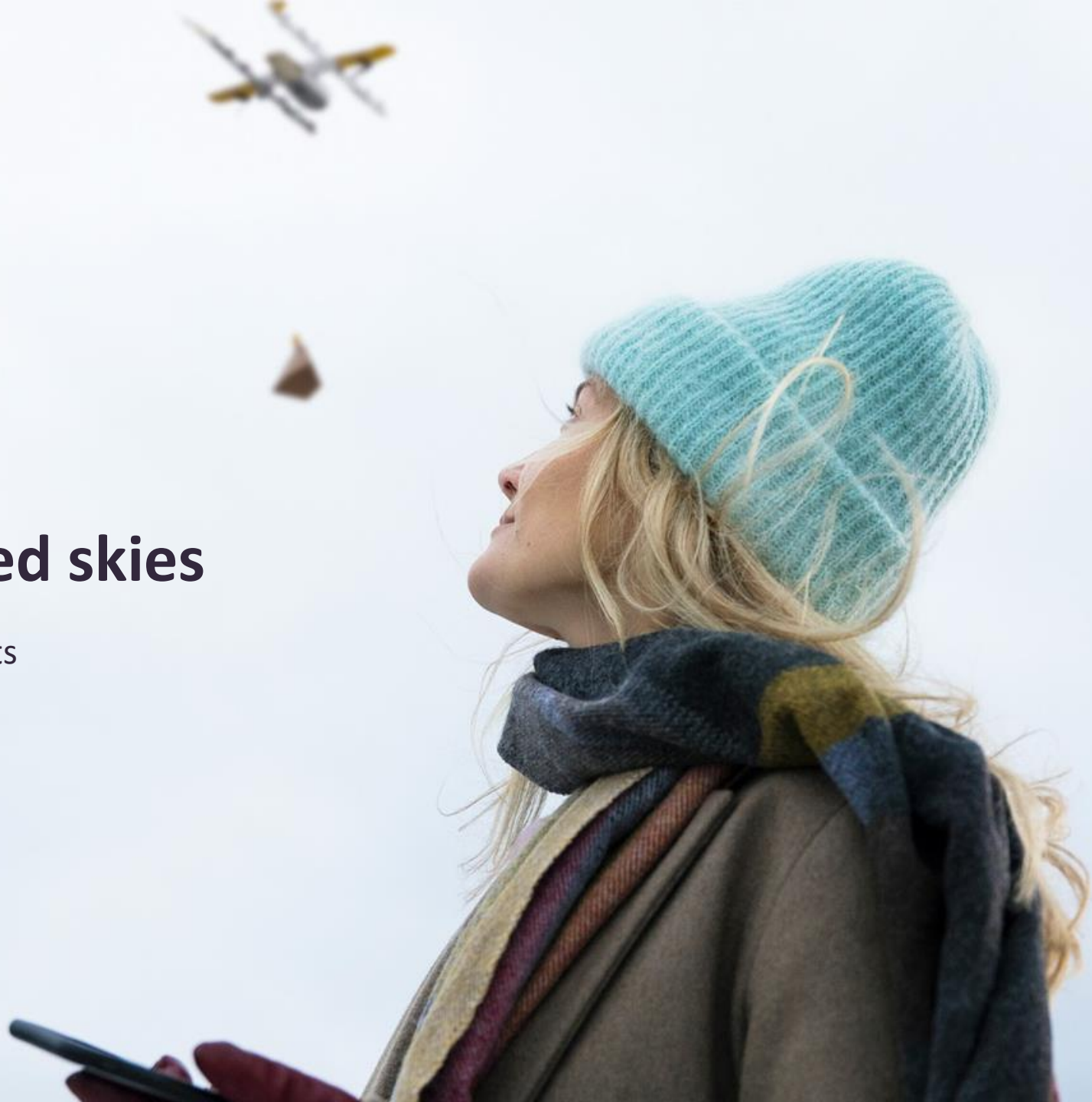
Panellist: **Alexandra FLORIN**
Wing Aviation Technical Standards
Manager



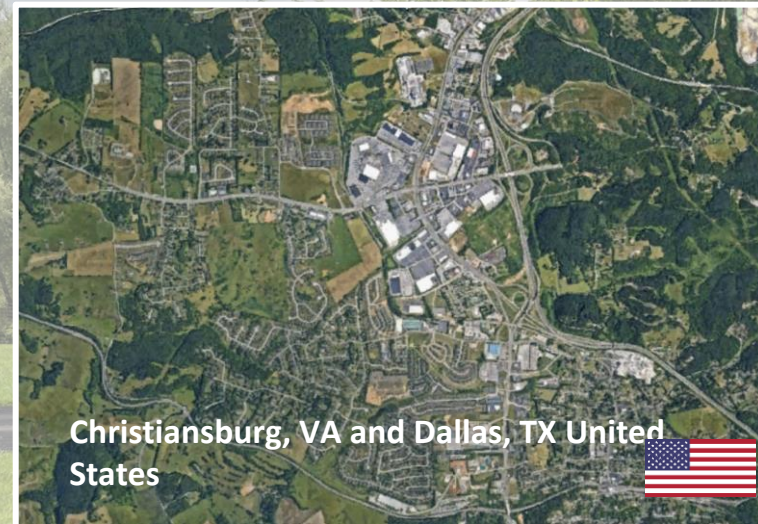


Drone delivery in shared skies

The experience of Wing on three continents

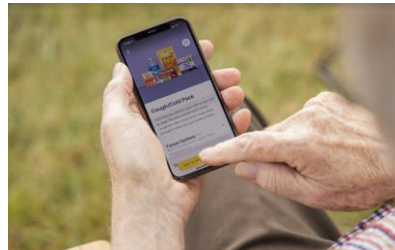


Wing operates BVLOS commercial flights over populated areas on three continents

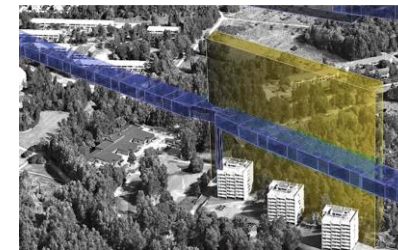


How does Wing operate today?

- Highly automated BVLOS operations with aircraft behaving and reacting in a predictable way
- Flights below 120m AGL, strategically deconflicted from other aircraft through planning
- 10 km range, 6.5 kg MTOW (including payload)



1. Order and preparation



2. Planning and validation



3. Automated checks and takeoff



4. Pickup (~7m above ground)

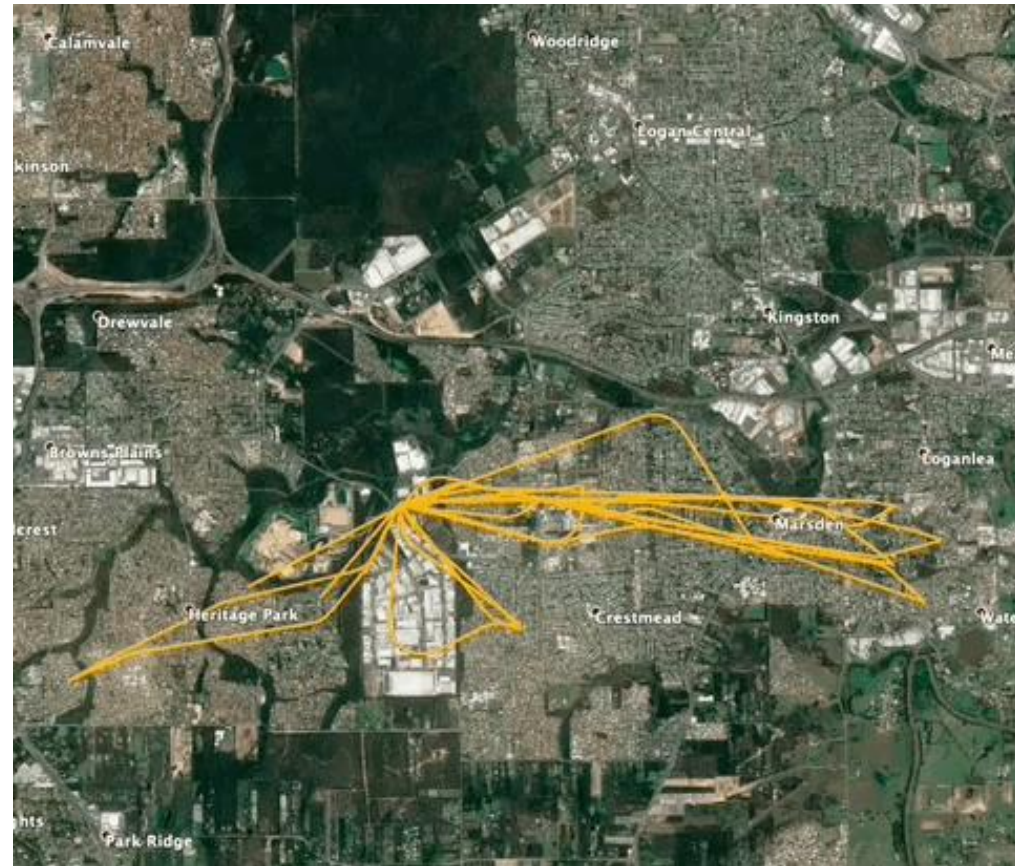


5. Cruise (~30-40m above ground)



6. Delivery (~7m above ground)

A typical day in Logan, Australia



Key roles and responsibilities for Wing's current operations

- **Ground Support Operator (GSO)**
 - GSOs are stationed on the ground in the service area.
 - GSOs generally set out the aircraft at the beginning of the day and position materials throughout the day.
 - Most aircraft are able to operate through an entire day without any hands-on human intervention, but GSOs are available when needed (e.g. if the aircraft is not making electrical contact at its charge pad)
- **Pilot in Command (PIC)**
 - Oversees multiple aircraft at multiple facilities from a remote location.
 - Monitors the operating area and local conditions, and can communicate with GSOs when needed.
 - Can command one or more aircraft to take action to avoid traditional aircraft but no joystick to manually control the aircraft.
 - Handover possible; operations are paused during handover

Tomorrow?

- In the future, roles will be completely decoupled so they can be scaled independently.
 - PICs will shift their focus from nest operations to supervising regions of airspace.
 - Instead of interacting with individual aircraft, they oversee a large area of operations.
 - PICs are becoming Airspace Supervisor
 - They manage a region of airspace and create real-time flight restrictions when it's not practical to create restrictions automatically.
 - GSOs become roving field technicians that manage the physical resources of a delivery network (e.g., pads and aircraft). Rather than coordinating with a PIC, they work independently from a prioritized queue of tasks.



wing.com





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Same same but different!

A brief military perspective on roles and responsibilities in 'certified category' commercial drone operations

Panellist: **Lt.Col. Oliver HORZ**
German Military Aviation Authority
Flight Operations Principles Section
Staff Officer – RPAS Operations



Workshop theme

Starting point:

With the introduction of UAS, the pilot is removed from the cockpit and, although on ground, the remote pilot continues to be the ultimate responsible for the safety of the conduct of flight.

Focus of the discussion:



Roles &
Responsibilities



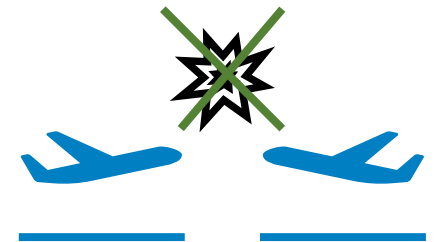
Regulation



Challenges



Share of
responsibility




Collision
avoidance

Roles & Responsibilities



 **Question:** Is there a change to the role and the responsibilities of the remote pilot due to this new setup?

 **Answer:** NO!

 **Explanation:**

- The definitions provided in Regulation 2018/1139, Regulation 2019/945 , ICAO Annex 1, and outlined in the EASA RMT230. concept paper Annex III **are sufficient and entirely valid** for the duties of a Remote Pilot.
- natural person (...) charged by the operator with duties
- responsible for safely conducting the flight (...) by operating its flight controls (...) or monitoring (...)

Regulation



Question: *Is a new regulatory approach needed?*

Answer: Maybe


Explanation: **Transfer of any function and responsibility within the remotely piloted systems is a matter of process development and compliance and might require regulation.**

- Pilot in Command vs Person in Command
 - Definitions summarized in EASA RMT.230 concept paper Annex III
 - Introducing “Person in Command”
 - Natural person // No-Pilot // Not in Ground Control Station // Command transfer possible
- Condition based transfer of command and responsibility
 - Normal / contingency / emergency RPA flight condition
 - Single Pilot operations - multi pilot operation – handovers / shift change
- Alternate / Emergency alternate provision / selection during planning / during the flight

Challenges



 **Question:** *What are the challenges imposed by new aviation technologies which ultimately aim at increasing levels of automation towards autonomy?*


 **Answer:** *The challenges are the acceptance of the departure from established, cherished procedures and processes as well as the adoption of flexible responsibilities and tasks.*

 **Explanation: “Let go of RPAS-fears and take flight to new opportunities”**


- Two perspectives to the question
- 1. RPAS are per se a technological, automation-based evolution of manned aviation.
- 2. RPAS type 1 operation and the challenges of increasing automation
 - Automation: Failure rates vs human error
 - Freedom: Airspace changes vs. Information exchange challenges (U-Space: E-Conspicuity, ATM/UTM info exchange)
 - Safety: See And Avoid vs Detect And Avoid

Share Of Responsibility



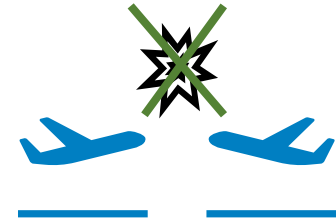
 **Question:** Should the responsibilities be relocated or shared with other stakeholders involved in the UAS design and operations?

 **Answer:** *Yes , absolutely!*

 **Explanation:** Selected fictional and real examples that can be used in the context of Type 1 operation for further discussion.

- Remote commander
- Detect And Avoid
- “Walk around”
- Ground Movement
- IT-personnel training
- Route planning

Collision Avoidance



Question: What about the responsibility for avoiding collisions with other airspace users?

Answer: Detect and avoid is no longer located alone within the realm of remote pilot responsibilities. It is ultimately an Operator responsibility which might be temporarily allocated to a Remote Pilot or a Person In Command!

Explanation: Selected arguments indicating a potentially required change of perspective

- Accommodation Phase (No Detect and Avoid System [DAA])
 - Operator is responsible for risk acceptance of a tasked flight
- Integration Phase: Selection, system integration, certification and use of the DAA
 - The operator responsible as far as she / he selected, ordered, integrated or certified a certain DAA system for all the flights of the respective RPAS type.
- C2-link loss required pre-determined DAA reactions, without pilot being in the loop
 - The importance of the DAA function in a particular part of flight (and hence the accepted risk level) is part of the shifting responsibilities between Operator, Remote Commander and Remote Pilot



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