The current study pathway was developed to represent an already experienced RP in the specific category, who has considerable experience in the operation of light fixed wing aircraft. He/she represents many professional RP who work for companies dedicated to operating uncertified UA outside the open/free operation category. Although having considerable experience in UA operation, this Persona will have to be re-skilled to fly larger, heavier UA that carry people on board.

Professional Remote in the specific category reskilling to fly optionally piloted aircraft / air taxis in the context of U-space operations		
FORMAL TRAINING		
	Main Topic	**Description of content**
Theoretical Training: Learning Courses and Instruction required to being ex. Pilot	Air Law	- Introduction to EASA and the aviation system - Regulation (EU) 2019/945 and Regulation (EU) 2019/947 (or other Vigeant at time) - National Regulation applicable to UAS (which may differ from International) - European and International law - U-Space - Unmanned Traffic Management (UTM) - Airspaces - Insurance - Responsibilities of the UAS operators and remote pilot - ICAO Annexes and documents - Registration (Operator, Remote Pilot and Aircraft) - Licensing - Rules of the air - Procedures for air navigation services - Air traffic services and Air Traffic Management (ATM) - Aeronautical Information Services (AIS) - Aerodromes - Search and rescue - Airworthiness and permit to fly requests (international and national rules) - Automatic control towers and remote tower control - Height and altitude measurement requirements - Mandatory and voluntary reporting

		Principles of Flight	- Aircraft flight characteristics - Primary and secondary flight controls - Lift augmentation - Thrust generation - Stall - Stability (long and lateral, static, and dynamic stability) - Flight limitations and envelope - Flight in adverse weather conditions - Speed of sound
		Performance	- Specific aircraft performance - Performance limitations - Stages of flight - Factors affecting performance - Take-off, Climb, Cruise, Descent, Landing and missed approach performance (in the case of multi-engine Performance with one engine inoperative) - Propulsion controls and electronic control systems - Battery management - Flight performance with partial system failure - Overriding autopilot control - Effect of cargo and payload on performance
		Aircraft Systems	- Aircraft specific systems and subsystems - Mainframe, wings, propellers, tail, canards, control surfaces, rotary wings - Landing gear - Powerplants and accessories; powerplant limitations (RPM, blade tip speed, ice, high temperatures) - Electrics and electronics - Flight management systems - Emergency recovery systems - Parachute and lifesaving equipment - Surveillance and ATC systems: GNSS, ADS-B, SSR and Transponder, Laser altimeter, TCAS, AGCAS, CPDLC.
		UAS General Knowledge	- Manual/piloted flight controls and handling - Tele-operation flight modes - Autopilot flight modes: fly-by-wire, automatic (altitude hold, course based, waypoint based), autonomous, including artificial intelligence - Control laws and flight envelope protection - Detect and avoid subsystems - Ground control station: introduction, configurations, crew specifications, systems, subsystems, and power backups

		- Datalink: frequencies, jamming, limitations, power, omni-vs-direct antennas, backups, network distribution and configuration - Payloads: electro-optic visible, infra-red and stabilized cameras, radar, synthetic aperture radar, magnetometer, range finder, droppable pods, cargo, communications jamming, ELINT, COMINT - Operational limitations: speed, load, mass, balance, flight envelope, weather, engine, flight controls
	Mass and Balance	- UA configurations and their effect on stability and performance - Static margin - Max and Min cargo/payload - Take-off masses and limitations - CG location limitations - Load and Trim Sheet
	Navigation and Flight Planning	- VFR navigation - IFR navigation and procedures - Satellite based navigation, incl. augmentation systems - Detect and avoid - Flight planning - Take-off and landing planning - Contingency planning - Lateral and vertical navigation - Airspace reservation
	Weather	- Pressure systems - Types of clouds - Fronts and respective characteristics - Ice formation conditions - Forecast and report - METAR, TAF, SPECI, SIGWX - Adverse weather conditions and implications to the UA - Meteorology and limitations imposed on the flights - Low level charts - Regional weather phenomena
	Operational Procedures	- Responsibilities of the RP - U-space and UTM procedures - ATM procedures - Surrounding environment analysis, including terrain, airspace, people, buildings, electromagnetic interferences, and jamming

		- Databases and accesses - where and how to consult the required updated information - Requirements of GCS, regarding minimal operational statues and backups - Briefing and debriefing - Checklists - Pre/post flight inspections - Flight preparation forms to be completed before flight - Overflight of uninvolved people - Procedures in case for operation near other aircraft - Manual/piloted flight and coordination with GCS RP. - GCS RP coordination with onboard pilot - BVLOS Operations; Low visibility operations; Aerodrome operating minima - Handover procedures - Emergency procedures - Duty times - Mandatory and voluntary reporting - Remote pilot logbook, maintenance records and other documentation - Notice to airmen (NOTAM) - Aeronautical Information Publication (AIP) - Emergency Response Plan (ERP) - Dangerous goods	
	Communications	- U-space and UTM communication procedures - SSR and transponder codes - ATM procedures - Phraseology - Reporting - Procedures for loss of communications and data link - Distress phases and procedures - Communication with automatic control system, CPDLC and remote tower controllers - Communication between RP and Onboard Pilot	

	Human Performance and Limitations	- Human sensing, equilibrium, vestibular systems - Oxygen and human limitations - Biases of remote/teleoperation when interpreting the sensors displayed in the GCS, including lags, delays and misinterpretation - Rest cycles - Workload management - Safety awareness - Threat and error management - Fit to fly self-analysis - IMSAFE assessment methodology - Limitations on perception (depth of field, distance/height to/from the UA, speed of the UA, night operations) - Disorientation - Stress, arousal, and fatigue – detection and mitigation - Perception - Perception - Attentiveness - Decision-making	
	Security, Privacy, and data protection	- Cybersecurity and good practices - Privacy and data protection for collected contents - Common attack methods, incl. hacking, GPS spoofing, jamming - Threat detection	
	Crew Resource Management / Multi-crew coordination	- Crew resource management techniques - Different types of personalities - Handling incorrectly perceived information - Tasking and commands within hierarchy of crew - Communication between onboard and remote pilots - Handling and attention to passengers - Airmanship - Leadership	
	Safety, Risk assessment and management	- Safety of people onboard - Safety of people on the ground - Safety towards other aircraft - Detect and avoid - Remote pilot and crew qualifications - Probability of failure	

		- System risk assessment
		- Maintenance procedures
		- Operational risk assessment for air and ground risk
		- Mitigation strategies
		- Presenting risk assessment to authorities for permit to fly issuance

	Main Topic	Description of content
Practical Training: All the hands-on training, which can include simulation, on-site training, supervision flying…	Simulation Training	- UAV manuals - Adapting to the simulator, GCS, and UA dynamics - Interaction with UAS software, firmware, and hardware - GCS cockpit layout, instruments and displays (PFD, ND, EICAS, overhead panel, central pedestal, standby instruments, radios, etc.) - Location and interpretation of commands, options, and warnings on GCS - Interpretation of sensor data and operational limits of each parameter - Flight planning (pre- and during flight) - Monitoring flight parameters, incl. flight modes, path, altitude, speed, temperatures, weather, datalink, instruments, transponder and ADS-B, backups, batteries, fuel, warnings, ATC coordination, geo-fencing - Situational awareness - Very low-level operations - Decision making - Briefing and debriefing - Hand-eye coordination - Emergencies and contingency - Crew coordination, incl. two-way communication between RP and Onboard Pilot - U-space integration, procedures, and new rules of the air - Perception of detect and avoid, interpreting sensors and automatic collision avoidance - Handling AI based systems and controls - ATC and automatic control practices - Changing ATC jurisdiction and type of airspace - Cyber- and data-link security, data protection
	Real-flight training on basic UA (if final UA is heavier or much more complex)	- UA manuals, UA status, logbook, anomalies - Operation of GCS Hardware and Software - Aircraft performance and limitations - Crew management and coordination (with external pilot, take-off technician) - Interpretation of sensor data and operational limits of each parameter - Pre-flight planning (weather, NOTAMS, flight plan, fuel, mass and balance, take-off performance, etc.)

		- Monitoring of the aircraft's flight path (position, trajectory, energy state, etc.) based on GCS data and pilot communications
		- Monitoring of the aircraft's systems (fuel, electrics, etc.) based on GCS data and pilot communications
		- Standard Operating Procedures (SOPs)
		- Briefing and debriefing
		- Flight procedures (before start, start, taxi, before take-off, taxi, (rejected) take-off, climb, operations, descent, approach, missed approach, landing, after landing, taxi and parking)
		- Adapting flight to weather, ATC, operational limitations, and other contingencies
		- Situational awareness
		- Very low-level operations
		- Communicating with other crew (e.g., payload operator, mission director) sharing and coordinating information
		- Crew coordination, incl. two-way communication between RP and Onboard Pilot
		- Decision making
		- Hand-eye coordination
		- Emergencies and contingency
		- U-space integration, procedures, and new rules of the air
		- Perception of sense and avoid, interpreting sensors and automatic collision avoidance
		- ATC and automatic control practices
		- Changing ATC jurisdiction and type of airspace
		- UA control handover to another RP in the same GCS
		- UA handover to another GCS
		- Cyber- and data-link security, data protection

TECHNICAL COMPETENCES					
Competence	Competence Description	Knowledge	Skill	Level	Preliminary Training Topics

Name	Short competence description	The individual should have knowledge of…	With this skill someone should be capable of….	Beginner Intermediate Advanced	How to acquire the skill?
Operation of UA and flight path control and management, manual/fly-by-wire	Coordinate the necessary in-flight manoeuvres with intended manual commands. Coordinate the flight path, maintaining proper guidance, and appropriate distance to obstacles, aircraft, terrain, and people, while interpreting the sensors and indicators	-Typical UA dynamics in 3D space -Aircraft control, piloting -Cockpit hardware, layout, functions, and software -Control and telemetry link between the GCS and the aircraft -How to conceptually avoid entering limited zones and avoiding conflict and risky situations by properly controlling the UA to avoid the areas (divert/heading change, climb, (de)increase airspeed	-Fly an aircraft within its limits -Operate onboard systems correctly, independently, and efficiently -Use the correct commands and inputs depending on the phase of the flight -Perform proper, steady, always coordinated flights and operations	Advanced	-Understanding of the UA flight performance, capabilities, and limitations. -Familiarization with cockpit and UA -Training and practising all allowed flight modes -Practical (both simulated and real) flights in various weather conditions within the limitations of the UA -Operation in abnormal conditions
Operation of GCS, UA flight path control and management, automation	Coordinate the necessary in-flight manoeuvres with intended commands and automation processes. Coordinate the flight path, maintaining proper guidance, and appropriate distance to obstacles, aircraft, terrain, and people, while interpreting the GCS sensors and indicators	-GCS hardware and software -Communication link between the GCS, the aircraft and ATC -Control and telemetry link between the GCS and the aircraft -Typical UA dynamics in 3D space -Types of automation typically present in a UA (tele-operation with stick and pedals, handset operation, remote fly-by-wire, automatic waypoint-based navigation, course navigation altitude hold, position hold -How to conceptually avoid entering limited zones and avoiding conflict and risky situations by properly controlling the UA to avoid the areas (divert/heading change, climb, (de)increase airspeed	-Operate GCS tools correctly, independently, and efficiently -Use the right ground control station tools depending on the phase of flight -Accurately fly the UA in BVLOS and FPV (video - first person view) operations -Coordinate his intentions with correct UA control -Perform proper, steady, coordinated flights and operations, by always selecting the proper flight mode and command -Interpret and cope with AI flight modes in a correct manner	Advanced	-Understanding of the UA flight performance, capabilities, and limitations -Familiarization with GCS/cockpit and UA flight modes -Training and practising all allowed flight modes -Practical (both simulated and real) flights in various weather conditions within the limitations of the UA; Operation in abnormal conditions
Application of Procedures	Identify and apply procedures in accordance with published operating instructions and applicable regulations, using the appropriate knowledge (Source: EBT ICAO)	-The importance of understanding and following procedures -The importance of regulations and rules of the air -The consequences of not following or understanding the procedures	-Understand the rules and restrictions applicable to the operation of the UA, in different locations and scenarios -Collect and assess proper information about current and future status of the UA, airspace limitations and segregation -Fulfil all requirements in terms of licences and requests necessary for the operations	Advanced	-Studying and learning from the theoretical course; applying the theoretical knowledge to the location/scenario of the operation -Being informed by the instructors about the reasoning behind the procedures and the consequences of not following them in terms of safety and security

Assessment of operational scenario	Assess the operational scenario of the operations, prior to and during the flight. Interpret the current and future status of the operational scenario based on flight planning, briefing information and current observations. Adjust flight path and control over the UA to perceived changing conditions	-The importance of performing scrutinous data collections (briefing, weather, flight planning, and contingencies) prior to the flight -The importance of being alert to the external factors affecting an operational scenario, and interpreting the information provided from the UA, considering the pre-flight briefing data	-Properly identify the limiting factors of the foreseen scenario of operation, including overflight of people, buildings, airspace limitations, weather, take-off and landing zones, contingency zones (MEUH) -Understand wind, clouds in the sky, their type and movement, water, infer uses for different zones in the scenario, including buildings, people actions and movement	Advanced	-Studying and learning from the theoretical course; attention to detail and all aspects comprising a given scenario -Comparing the influence of a misinterpretation of the pre-flight information bulletin/briefing -Practical training, in normal and simulated abnormal conditions
Risk assessment and safety-based judgement	Identify and rank risks, to determine which are critical and above the risk tolerance or threshold and thus require attention, and then to select the risk management action(s) to take in response	-Risk assessment of the operational scenario, limiting factors and status of the UA	-Establish hierarchies of priorities according to the mission and MEUH, define "go / no go" and "return-to-home" conditions, forbidden areas or actions based on MEUH	Advanced	-This skill is highly dependent on the knowledge and attitude of the remote pilot; it will depend on intrinsic factors, like the boldness of the RP to take risks and to consider risks with low probability of occurring as being risk that should be acknowledged and mitigated -The trainees should be aware of the safety behaviours and trained of how they can follow them on the field -Training should have a practical component with case studies from real pilot situations and even with on-field training
KEY BEHAVIOURAL SKILLS AND COMPETENCES					
Competence	**Competence Description**	**Knowledge**	**Skill**	**Level**	**Preliminary Training Topics**
Name	*Short competence description*	*The individual should have knowledge of…*	*With this skill someone should be capable of….*	*Beginner Intermediate Advanced*	*How to acquire the skill?*

Situational awareness	Perceive and comprehend all the relevant information available and anticipates what could happen that may affect the operation (s: ICAO EBT)	-Factors affecting situational awareness of external factors and UA statuses -How to place identify the correct location and trajectory that the UA should take to perform the desired action 3D space -Ways of determining distances from obstacles, aircraft, clouds, and populated areas -The surveillance systems (for weather, traffic, and terrain avoidance) -Aircraft general knowledge (systems, instrumentation)	-Perform solid navigations in 3D space and manage both external factors that have changed during the flight, as well as internal status of the UA (e.g., fuel, battery, link, geofence violation, inability to control payload) -Perform proper, solid, and precise navigation of the UA in 3D space -Anticipate accurately what could happen, plans, and stays ahead of the situation -Recognize and effectively respond to indications of reduced situation awareness	Intermediate	-This skill is dependent on the capability of absorbing and paying distributed attention to several factors extrinsic and intrinsic to the UA -This skill can be acquired by training distributed attention during daily activities, as well as simulated and real flying/training
Analytical Capability	Collect and analyse information, problem-solve, and make decisions	-Basic forms of processing information and channelling it to perform sensemaking and logic-related tasks	-Properly manage and prioritize the several the stimuli received -Process information from different sources in well organized, priority- based management strategy -This information can be provided to all five senses of the RP	Advanced	-Theoretical Training -How to process information -Techniques to analyse information: written and visual -This skill can be trained in classroom where we can assess the individual's level and present different techniques to analyse information. The simulation will be the practical exercise, where information with different priorities is provided via stimuli to all five senses
Problem solving and Decision making	Identify risks and resolves problems. Use the appropriate decision-making processes (s: ICAO EBT)	-The existing rules and the existing procedures -The possible solutions to apply in specific situations -Priority and urgency -The priorities in specific situations -The impact on safety that some actions may have -The Problem-solving techniques	-Keep still when facing disturbances: orally explain possibilities and elaborate troubleshooting process to understand abnormalities in flight and final decision making -Review and improve past decision during debriefing -Implement an appropriate solution to a problem -Determine the situations that have the highest priority	Advanced	-Theoretical Training: Possible solutions to apply in specific situations Potential hazards How to set priorities in specific situations Risk Assessment process -This skill is deeply connected to the attitude and personal behaviour of the RP -Nevertheless, it can be trained by stimulating stress and forcing the RP to cope with it during simulated and real

					operations. This skill is also dependant on the experience of RP -Training quick assessment of possibilities, and rapid reasoning of their respective outcomes
Workload Management	Manage available resources efficiently to prioritize and perform tasks in a timely manner under all circumstances	-Aviation psychology (human overload and underload, fatigue, and stress management, etc.) -Threat and error management -Time management / planning -Multi-tasking strategies	-Maintain self-control in all situations -Plan, prioritize, and schedule tasks effectively -Manage time efficiently when carrying out tasks -Offer and accept assistance and ask for help early -Review, monitor and cross-check actions conscientiously -Manage a recovering from interruptions, distractions, variations, and failures effectively -Perform all the above for one or more aircraft with a single on-board pilot	Advanced	-Practising parallel processing and multitasking -Practising the establishment of priorities -Train on the detection of lags on the assessment of current statuses of the systems and identifying main causes of the lags/distractions
Communication	Demonstrate effective verbal and non-verbal communications, in normal and non-normal situations	-The importance of properly communicating to the crew and to outside receiver stations -Types of communication -Effective communication techniques	-Actively listen -Ensure the recipient is ready and able to receive the information -Ask relevant questions -Accurately read and interpret required documentation and datalink messages -Correctly interpret non-verbal communication -Convey messages clearly, accurately, and concisely -Crew resource Management	Advanced	-Communication styles and techniques -The Communication processes -Active Listening and effective communication -Performing quick reasoning of information received and try to pose different questions to it -Practising reading of technical documentation to better get a sense of the type of language used -Practicing crew and ATC communications -An important extra will be English Language -Instruction of the main expressions of non-verbal communication