
REMOTELY
PILOTED
AIRCRAFT
SYSTEMS
Welcome
ICAO RPAS WORKSHOP


REMOTELY
PILOTED
AIRCRAFT
SYSTEMS
ICAO
RPAS


BREAKING NEWS
193 INCIDENTS
12 INCIDENTS
In New York City
9 TIMES
The expansion of recreational use of small drones by non-aviation persons is becoming one of the most significant hazards to manned aviation

BREAKING NEWS

VOL. XI - n. 4350 NCLB INITIATIVE PREPARING FOR THE FUTURE MONTREAL APRIL 2016


Plane landing at Heathrow in near miss with drone that didn't show up on radars

Number of incidents involving unmanned aircraft with the traditional manned aviation are escalating to an alarming stage

BREAKING NEWS

VOL. XI - n. 4350 NCLB INITIATIVE PREPARING FOR THE FUTURE MONTREAL APRIL 2016

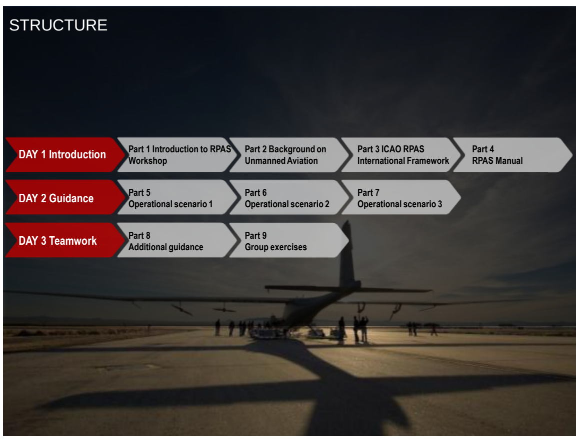
Purchasers of small drones do not have the information regarding the responsibilities and consequences to fly such drones in the proximity of airports and over populated areas

BREAKING NEWS

VOL. XI - n. 4350 NCLB INITIATIVE PREPARING FOR THE FUTURE MONTREAL APRIL 2016

Awareness campaigns to educate the public about the safe operation of small drones are needed. Many States have not yet developed such initiatives


BREAKING NEWS
Regulations and guidance for the fast growing unmanned aviation in all its different modalities are necessary


STRUCTURE
DAY 1 Introduction
Part 1 Introduction to RPAS Workshop
Part 2 Background on Unmanned Aviation
Part 3 ICAO RPAS International Framework
Part 4 RPAS Manual
DAY 2 Guidance
Part 5 Operational scenario 1
Part 6 Operational scenario 2
Part 7 Operational scenario 3
DAY 3 Teamwork
Part 8 Additional guidance
Part 9 Group exercises


DAY 1 INTRODUCTION
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Part 1 Introduction to RPAS Workshop
Part 2 Background on Unmanned Aviation
Part 3 ICAO RPAS International Framework
Part 4 RPAS Manual

OUTLINE

DAY 1 Introduction | Part 1 Introduction to RPAS Workshop | Part 2 Background on Unmanned Aviation | Part 3 ICAO RPAS International Framework | Part 4 RPAS Manual

- Introduction of instructors and participants
- House keeping and administrative information
- Objectives
- Structure
- Guidance material

MEET RPAS INSTRUCTOR TEAM

MEET RPAS INSTRUCTOR TEAM

Mike has over 35 years experience in aviation, within industry and as a regulator in UK CAA and the European Aviation Safety Agency in the design and certification of civil aircraft, continued airworthiness during operation and organisation approval assessment/oversight.

Currently holding a position within the CAA Policy team responsible for the development of the airworthiness regulatory frameworks for emerging technologies, in particular the integration of Unmanned Aircraft Systems and Space planes into the aviation systems and provision of airworthiness subject matter expertise to the wider business.

Michael Gaad
Lead instructor

MEET RPAS INSTRUCTOR TEAM

Prior to this he held a number of technical specialist and manager roles within the initial design and certification, continued airworthiness and safety areas, culminating in managing the CAA UK aircraft certification section team of technical experts responsible for certification approval and continued airworthiness activities, providing support to military projects, oversight of approved organisations, rulemaking and policy development, and technical advice and training worldwide.

Michael Gaad
Lead instructor

MEET RPAS INSTRUCTOR TEAM

Filippo was flight test engineer in the Italian Air Force for about 10 years. From 1984 in ENAV (Italian civil Air Traffic Control) was responsible for R&D and for a number of modernization projects. Member of the ICAO Committee on Future Air Navigation Systems (FANS), then chaired ICAO Panels on Automatic Dependent Surveillance and Mobile Communications.

In 2000 joined EUROCONTROL as manager for ATM/ANS plans in Northern Europe.

Prof. Filippo Tomasello

MEET RPAS INSTRUCTOR TEAM

In 2005 entered the European Commission, working on accident investigation and extension of EASA to ATM/ANS and aerodromes.From 2007 to 2015, rulemaking officer at EASA, with focus on unmanned aircraft and co-chair of the ICAO Study Group on the matter.

Now Professor at University Giustino Fortunato, Technical Director of the Italian branch of http://eurousc.com/ and senior instructor on RPAS at JAA-TO.

Prof. Filippo Tomasello

MEET RPAS INSTRUCTOR TEAM

Professor Liu is the member of the drafting committee of the Regulation on Unmanned Aircraft System in China.

As the Director of Institute of Aviation Law and Standard in Beihang University (BUAA) and Deputy Director of China National Research Center of ATM Law and Standard, Professor Liu and his team provide consultation to Civil Aviation Administration of China, State Air Traffic Control Commission of China, and other government and military bodies on UAS/RPAS issues.

Prof./Dr.Liu Hao

MEET RPAS INSTRUCTOR TEAM

Besides the work on UAS/RPAS, Professor Liu is highly involved in the air and space legislation and policy making, he is the member of Drafting or Revision Committees of Aviation Law, Regulation on Airspace, Regulation on the Promotion of Civil Aviation Industry, Regulation on Air Traffic Management of General Aviation, etc.

Professor Liu is the Co-Chair of the Working Group 6 (Concept of Operation) of JARUS and working in the Working Group 5 (Operation of RPAS) of the ICAO RPAS Panel.

Prof./Dr.Liu Hao

INTRODUCTION OF THE PARTICIPANTS

Your current job

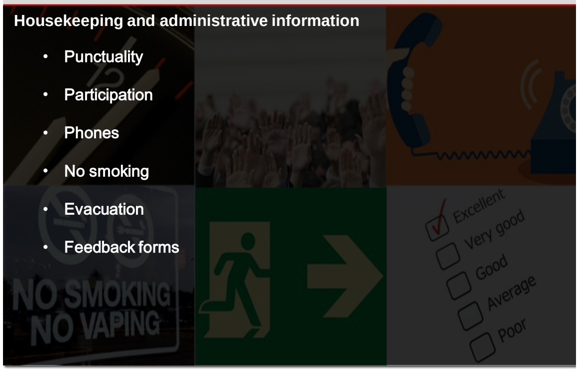
Your expertise

Your name

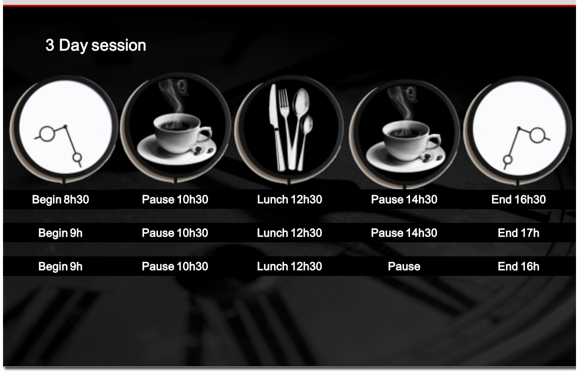
Your expectations

Something unique about you

INTRODUCTION TO RPAS WORKSHOP



INTRODUCTION TO RPAS WORKSHOP



INTRODUCTION TO RPAS WORKSHOP

At the end of the ICAO RPAS Workshop:

1. Participants will acquire the knowledge regarding the ongoing work by ICAO regarding the development of the international regulatory framework through Standards and Recommended Practices (SARPs), as well as procedures and guidance material contained in Manual on Remotely Piloted Aircraft Systems (RPAS) Doc 10019.

OBJECTIVES

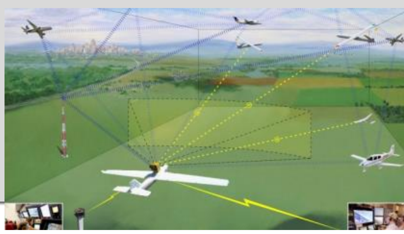
At the end of the ICAO RPAS Workshop:

2. Staff members of Civil Aviation Authorities will be able to identify the role of the State in regulatory development as well as the responsibilities in overseeing RPAS operations

OBJECTIVES

At the end of the ICAO RPAS Workshop:

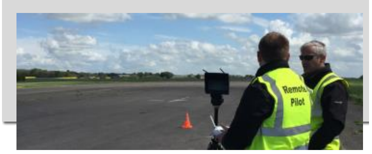
3. Staff members of Air Navigation Service Providers (ANSPs) will be able to identify the issues to be addressed when integrating RPAS into the ATM system



OBJECTIVES

At the end of the ICAO RPAS Workshop:

4. Specific staff members of RPAS operators and other service providers will obtain the necessary knowledge, regarding certification requirements and the impact of their operation in relation to the well-established manned aviation system



OBJECTIVES

At the end of the ICAO RPAS Workshop:

5. Participants will identify different sources of RPAS related information from States and international organizations' webpages dedicated to Unmanned Aviation

Guidance material and resources:

RPAS Manual

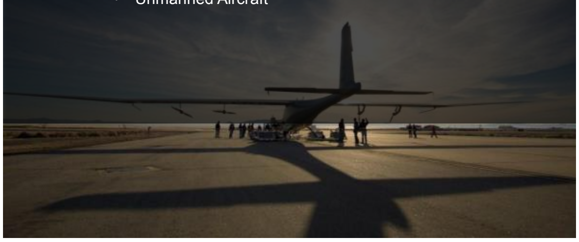
GRID RPAS Operations

RPAS website

Outline

DAY 1 Introduction | Part 1 Introduction to RPAS Workshop | Part 2 Background on Unmanned Aviation | Part 3 ICAO RPAS International Framework | Part 4 RPAS Manual

- Historical Perspective
- Unmanned Aircraft



1849 : HISTORICAL PERSPECTIVE

1849
1916
1935
1940
1960
1980
1995
2006

Austrian War Balloons

The first flight of a lighter-than-an-aircraft took place in 1849 when Austria sent unmanned, bomb-laden balloons to attack Venice

1916 : HISTORICAL PERSPECTIVE

1849
1916
1935
1940
1960
1980
1995
2006

Ruston Proctor Aerial Target

The first 'pilotless' aircraft is believed to be the Ruston Proctor Aerial Target, built in 1916, only 13 years after the first successful controlled manned flight by the Wright brothers on 17 December 1903

1935 : HISTORICAL PERSPECTIVE

1849
1916
1935
1940
1960
1980
1995
2006

Converted De Havilland Tiger Moth, known as the Queen Bee

Following WWI, many conventionally piloted aircraft were converted into radio controlled "pilotless" aircraft for use as targets. One of the most successful was a converted De Havilland Tiger Moth, which became known as the Queen Bee. It is believed that the term 'drone' was adopted in homage to the Queen Bee

1940 : HISTORICAL PERSPECTIVE

1849
1916
1935
1940
1960
1980
1995
2006

Reginald Denny and his OQ- 3

The OQ-2 Radioplane was the first mass-produced RPA (drone) in the US. A follow-on version, the OQ-3, became the most widely used target aircraft in US service, with over 9,400 being built during World War II

1960 : HISTORICAL PERSPECTIVE

1849
1916
1935
1940
1960
1980
1995
2006

Lockheed D-21 Mach 3 supersonic

The Lockheed D-21 was an American reconnaissance drone with maximum speed in excess of Mach 3. The D-21 was initially designed to be launched from the back of a M-21 carrier aircraft. Development began in October 1962. Originally known by the Lockheed designation Q-12, the drone was intended for reconnaissance deep in enemy airspace

1980 : HISTORICAL PERSPECTIVE

1849
1916
1935
1940
1960
1980
1995
2006

Sikorsky Cypher

The Cypher and Cypher II are types of RPA developed by Sikorsky Aircraft.
They are vertical take-off and landing aircraft which use two opposing rotors enclosed in a circular shroud for propulsion

1995 : HISTORICAL PERSPECTIVE

1849
1916
1935
1940
1960
1980
1995
2006

General Atomics MQ-1 Predator

The MQ-1 Predator is an RPA built by General Atomics and used primarily by the United States Air Force (USAF) and Central Intelligence Agency (CIA). The aircraft has been in use since 1995, initially conceived in the early 1990s for aerial reconnaissance and forward observation roles

1995 : HISTORICAL PERSPECTIVE

1849
1916
1935
1940
1960
1980
1995
2006

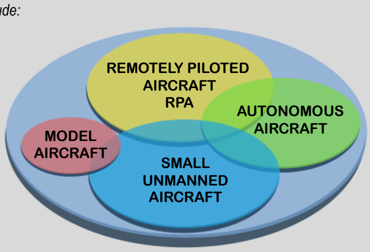
DJI Phantom

DJI manufactures a range of small UAS (a.k.a. drones) for industrial, professional and amateur purposes. This manufacturer among many others are expecting to get the global drone market to reach USD 5.59 Billion by 2020

Unmanned aircraft (UA)

Unmanned aircraft (UA) :

Any powered or unpowered aircraft that is flown without a pilot onboard. These aircraft may operate autonomously or with a remote pilot. UA include:



Unnamed aircraft (UA)

MODEL AIRCRAFT

Model aircraft

- for recreational (hobby) purposes
- non commercial
- flown visual line of sight (VLOS) in visual meteorological conditions (VMC)
- low altitude – normally below 120 meters
- normally conducted away from aerodromes and populated areas

Unmanned aircraft (UA)

SMALL UNMANNED AIRCRAFT

Small Unmanned Aircraft

- for recreational or commercial purposes
- most popular category of UA
- usually flown visual line of sight (VLOS) in VMC
- may require special authorization and coordination from the competent authority to operate in the vicinity of an aerodrome
- Commonly referred to as Drones

Operations will generally be conducted under the following conditions:

- < 120 meters/400 feet
- daytime VMC
- > 30meters from people
- > 5.5 km from an aerodrome
- outside of controlled airspace
- Generally < 25 kg

Unmanned aircraft (UA)

REMOTELY PILOTED AIRCRAFT RPA

RPA definition (ANNEX 2)
An Unmanned aircraft which is piloted from a Remote Pilot Station:

- expected to be integrated into the Air Traffic Management System equally as manned aircraft
- real time piloting control is provided by a licensed remote pilot

Unmanned aircraft (UA)

AUTONOMOUS AIRCRAFT

Autonomous aircraft

- an unmanned aircraft that does not allow pilot intervention in the management of the flight
- not a specific type of unmanned aircraft but a characteristic in its operation

Outline

DAY 1 Introduction | Part 1 Introduction to RPAS Workshop | Part 2 Background on Unmanned Aviation | Part 3 ICAO RPAS International Framework | Part 4 RPAS Manual

- Overview of ICAO
- History of the Legal Framework
- Foundations of the Legal Framework
- The development of the Legal Framework
- UASSG and RPASP
- Focus of ICAO and States
- Guidance principles for RPAS Operations

Overview of ICAO

- ICAO is a specialized agency of the United Nations established in 1944 to manage the administration and governance of the Convention on International Civil Aviation (Chicago Convention)
- ICAOs headquarters are located in Montreal with 7 Regional Offices around the world
- The ICAO Council is a permanent body that gives continuing direction to the work of ICAO

Overview of ICAO

- The Secretary General is responsible for general direction of the work of the Secretariat
- The Air Navigation Commission (ANC) considers and recommends Standards and Recommended Practices (SARPs) and Procedures for Air Navigation Services (PANS) for adoption or approval by the ICAO Council
- Standards and Recommended Practices (SARPs) once adopted by Council are translated into national regulations by States

Do you know ?

- Panels and Study Groups are technical groups of qualified experts.
- The ANC works through established panels of experts in various disciplines who are assigned specific tasks from the overall work programme.
- RPAS Panel is one of those groups of experts

History of the legal framework

- The legal framework for ICAO started with the Paris Convention on 13 October 1919
- The Protocol of 15 June 1929 amending the Paris Convention first refers to "pilotless aircraft''
- The Chicago Convention of 7 December 1944 replaced the Paris Convention which included Article 8 entitled "Pilotless aircraft"
- All unmanned aircraft, whether remotely piloted, fully autonomous or combinations thereof, are subject to the provisions of Article 8 of the *Convention on International Civil Aviation*

Article 8

Article 8
"Pilotless aircraft"

No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft."

Note: Article 8 of the Chicago Convention assures each Contracting State of the absolute sovereignty over the authorization for RPA operations over its territory - ICAO Assembly Resolution A38-12 – Oct, 2013

Foundations of the Legal Framework

International civil aviation:

- Developed in a safe and orderly manner
- On basis of equality of opportunity
- Applies equally to manned and unmanned

Art 3 bis – Civil and state aircraft
Art 12 – Rules of the air
Art 15 – Airport and similar charges
Art 29 – Documents carried in aircraft
Art 31 – Certificates of airworthiness
Art 32 – Licenses of personnel
Art 33 – Recognition of certificates of licenses

Development of the legal framework for Unmanned Aircraft

- need *special authorization* to fly a UA over another contracting State
- UA must be controlled to *obviate danger* to civil aircraft
- remotely piloted aircraft are one type of unmanned aircraft
- ICAO serves as the focal point for global interoperability and harmonization

Annexes affected by SARPs related to RPAS

- Annex 1 - Personnel Licensing
- Annex 2 - Rules of the Air
- Annex 3 - Meteorological Services
- Annex 4 - Aeronautical Charts
- Annex 5 - Units of Measurement
- Annex 6 - Operation of Aircraft
- Annex 7 - Aircraft Nationality and Registration Marks
- Annex 8 - Airworthiness of Aircraft
- Annex 9 - Facilitation
- Annex 10 - Aeronautical Telecommunications
- Annex 11 - Air Traffic Services
- Annex 12 - Search and Rescue
- Annex 13 - Aircraft Accident and Incident Investigation
- Annex 14 - Aerodromes
- Annex 15 - Aeronautical Information Services
- Annex 16 - Environmental Protection
- Annex 17 - Security
- Annex 18 - The Safe Transportation of Dangerous Goods by Air
- Annex 19 - Safety management

UASSG and RPASP

UASSG

- First meeting Apr, 2008
- Scope - three task groups
- Develop accident and incident investigation requirements for UAS
- Develop a coordination and cooperation framework for interaction with other standards-making organizations
- Develop an outline of a regulatory guidance document relating to unmanned aircraft systems

Unmanned Aircraft Systems Study Group (UASSG)

UASSG and RPASP

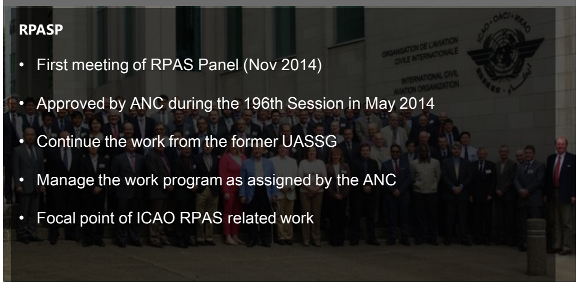
Outcomes 2008-2014

Amendments to:

- Annex 13 - Definition of accident
- Annex 2 - Certification and special authorizations
- Annex 7 – Registration
- Circular - 328 UAS
- Draft RPAS Manual (Doc 10019)

Unmanned Aircraft Systems Study Group (UASSG)

UASSG and RPASP



RPASP

- First meeting of RPAS Panel (Nov 2014)
- Approved by ANC during the 196th Session in May 2014
- Continue the work from the former UASSG
- Manage the work program as assigned by the ANC
- Focal point of ICAO RPAS related work

Remotely Piloted Aircraft Systems Panel (RPASP)

Focus of ICAO and States

- ICAO main focus:
  - international IFR operations
  - global interoperability
  - fundamentals to initiate international operations:
    - Certificate of airworthiness
    - RPAS operator certificate
    - Remote pilot license

- State (National Authority) Focus:
  - domestic operations, which may differ significantly from international operations

Focus of ICAO and States

To support States in their development of national regulations

- ICAO formed an advisory group to share best practices regarding small UAS operations (SUAS)

Guiding Principles for RPAS Operations

- RPA shall be operated in such a manner as to minimize hazards to persons, property or other aircraft;
- RPAS regulations should address the protection of society from mid-air collisions with aircraft and crashes into the ground.
- No distinction is made between commercial air transport and general aviation operations conducted by RPA.
- Ultimately, RPAS are to be integrated into the existing aviation system without negatively affecting manned aviation.
- Until RPA can meet all the requirements for integration, they may be accommodated by being restricted to specific conditions or areas.
- In order for RPA to be integrated into non-segregated airspace and at aerodromes, a remote pilot may only control one RPA at any given time.

Outline

DAY 1 Introduction | Part 1 Introduction to RPAS Workshop | Part 2 Background on Unmanned Aviation | Part 3 ICAO RPAS International Framework | Part 4 RPAS Manual

- Scope and purpose of the Manual (Chapter 1)
- Introduction to RPAS (Chapter 2)
- Special authorization (Chapter 3)
- Type certification and airworthiness approvals for RPA, RPS and RPAS (Chapter 4)
- RPA registration (Chapter 5)
- Responsibilities of the RPAS operator (Chapter 6)
- Safety management (Chapter 7)
- Remote pilot licensing and RPA observer competencies (Chapter 8)
- RPAS operations (Chapter 9)
- Detect and avoid (Chapter 10)
- Command and control (C2) link (Chapter 11)
- ATC communications (Chapter 12)
- Remote pilot station (RPS) (Chapter 13)
- Integration of RPAS operations into ATM and ATM procedures (Chapter 14)
- Use of aerodromes (Chapter 15)

Chapter 1 - Purpose and scope of the RPAS Manual

Purpose of the RPAS Manual :

- provide guidance on the technical and operational issues applicable to the integration of RPA into non-segregated airspace and at aerodromes
- material in the Manual consistent with the standards already adopted for RPAS
- manual will be updated and expanded as additional provisions are developed

Chapter 1 - Purpose and scope of the RPAS Manual

Scope of the RPAS Manual:

- RPAS addressed as one subset of UAS
- RPAS envisioned to be an equal partner in the civil aviation system
- guidance is consistent with the existing aviation regulatory framework and will assist in the development of future RPAS-specific SARPs
- material recommended for the benefit of the entire UAS community (e.g. regulators, manufacturers, operators, pilots, and air navigation service providers)

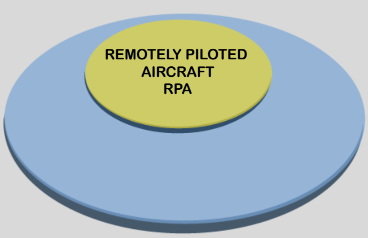
Chapter 1 - Purpose and scope of the RPAS Manual

Manual does not address:

- State Aircraft
- autonomous unmanned aircraft (e.g. unmanned free balloons)
- operations in which more than one RPA is being managed by a single remote pilot
- unmanned aircraft used for recreational purposes only
- VLOS operations

Chapter 2 – Introduction to RPAS

- Unmanned aircraft are aircraft but they have many styles and different capabilities. Regulators need to be able to distinguish the different categories. Where the ICAO SARPs will only address the RPAS subset



Remotely Piloted Aircraft System (RPAS) Components:

An unmanned aircraft which is piloted from a remote pilot station is an RPA. All aircraft classified in Table 2-1 could be remotely piloted

An RPAS consists of the following:

remotely piloted aircraft
remote pilot Station (s)
command and Control (C2) link
other components as specified in the type design

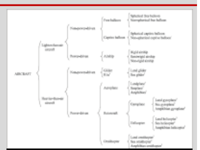
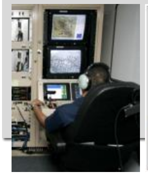
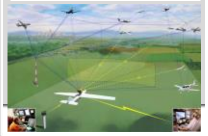


Table 2- 1. Classification of aircraft. RPAS Manual page 2-2





Criteria for RPA Categorization

- **Maximum take-off mass MTOM**
- **Kinetic energy**
- **Performance criteria**:
  - speed
  - range
  - endurance

  Factors affecting Performance:
  - barometric pressure
  - pressure-altitude
  - temperature
  - humidity
  - wind
  - runway slope, and
  - surface conditions of the runway

Criteria for RPA Categorization

- **Type/area of operations**:
  - Policing
  - Firefighting
  - Aerial photography
  - Aerial surveying
  - Powerline inspection
  - Aerial spraying
  - Search and rescue
  - Cargo delivery

RPAS Operations

The operation of RPAS will be determined by:

- **Type of operation**
- **Flight rules**
- VLOS operations are normally limited to visual meteorological conditions (VMC)
- IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals
- While VFR and IFR apply, as they do for manned aircraft (e.g. requirements for equipment, operations and responsibility); they can be more difficult to address for RPA

RPAS Operations

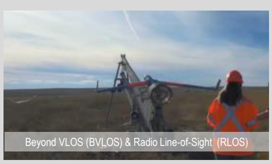
The operation of RPAS will be determined by:

- **Areas of operation**:
  - **INTERNATIONAL OPERATIONS**. In manned aviation, international operations are considered to be those in which the aircraft crosses an international border or operates in high seas airspace
  - RPAS present additional scenarios for consideration:
    - the RPA only, the RPS only or both the RPA and RPS are operated in other than the territory of the State of the Operator
    - RPA is carried onboard a vehicle from one State to another (portability)
- **Functional levels of the C2 links**.

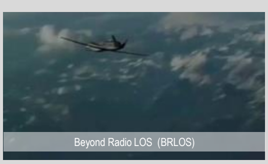
VLOS/BVLOS Operations

The capability of an RPA will usually be determined by the type of on-board technology. Some examples include:

Visual Line-Sight (VLOS)



Beyond VLOS (BVLOS) & Radio Line-of-Sight (RLOS)

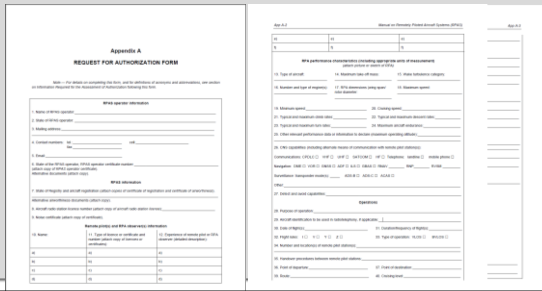


Beyond Radio LOS (BRLOS)

Chapter 3 – Special Authorization

Annex 2 – Appendix 4

RPA shall not be operated across the territory of another State without special authorization issued by each State in which the flight is to operate. This authorization may be in the form of agreements between the States involved


Appendix A
REQUEST FOR AUTHORIZATION FORM

Appendix A. RPAS Manual App A-1

Chapter 4 – Type Certification and Airworthiness Approvals

General requirements

- manned aircraft type design approval processes are applicable
- ICAO Airworthiness Manual (Doc 9760) is applicable
- the RPA **must** have type design approval for international operations.
- the RPS **may** have type design approval for international operations.
- the design approval for the RPA includes the RPS(s), the C2 link(s), and any other components
- the RPA must hold a Certificate of Airworthiness (CofA)

Chapter 5 – RPA Registration

Nationality and registration marks

- Article 20 – Any aircraft engaged in international navigation should bear registration mark
- RPA sizes differ from manned aviation
- new SARPs in Annex 7 accommodate these differences

Identification plate

- Annex 7 mandates the State of Registry to determine the appropriate location to secure the identification plate

Chapter 6 – Responsibilities of the RPAS Operator

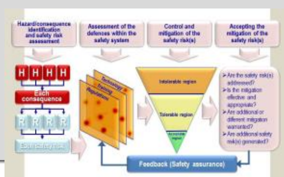
RPAS

- role and responsibilities of an RPAS operator, based upon provisions in Annex 6, Part I
- responsibilities may include among others:
  - RPAS Operator Certificate (ROC)
  - personnel management
  - document requirements
  - oversight of service providers
- operating facilities

Chapter 7 – Safety Management

RPAS operator's SMS

- all RPAS operators must be certified by the State
- the RPAS operator is responsible for the safe conduct of all operations
- RPAS operator must implement an SMS relevant to the size and complexity of the operation.
- the introduction of RPA into non-segregated airspace requires a thorough assessment of the safety performance of the RPAS operations.



Chapter 7 – Safety Management

Safety responsibilities

- responsible for work by contractors, unless contractor is certified

- coordination of emergency response planning

Chapter 8 – Licensing and Competencies

Guidance on rules for remote pilot licence and RPA observer competency

- human performance
- language proficiency
- issue of remote pilot licences
- training standards

Chapter 8 – Licensing and Competencies

Guidance on rules for remote pilot licence and RPA observer competency

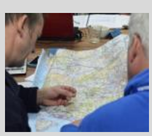
- remote pilots have the same basic responsibilities as pilots of manned aircraft for the operation of the aircraft in accordance with the rules of the air, and the laws, regulations and procedures of those States in which operations are conducted
- a person must not act either as remote pilot in command (PIC) or as a remote co-pilot of an RPA unless that person is the holder of a remote pilot licence, containing the ratings suitable for the purpose of executing the operation
- proof of language proficiency in either English or the language used for communications involved in the remotely piloted flight should be endorsed on the remote pilot licence

Chapter 8 – Licensing and Competencies

Remotely Pilot licence (RPL) subjects of knowledge

Applicants for a RPL should demonstrate knowledge among others on:

- air law
- RPAS general knowledge
- human performance
- meteorology
- navigation
- operational procedures
- radiotelephony



Chapter 8 – Licensing and Competencies

Practical skill test may include :

- management of threat and errors
- operation of RPA within its limitations
- complete manoeuvres with accuracy
- apply aeronautical knowledge

Chapter 8 – Licensing and Competencies

RPA observer competency

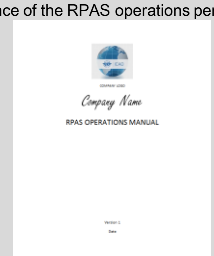
- the RPAS operator is responsible for ensuring the competency of RPA observers
- a person should not act as an RPA observer unless that person has undergone a competency-based training on visual observer duties concerning RPA VLOS operations
- there is no intent to license RPA observers

Chapter 9 – RPAS Operations

Manuals

- Operations Manual

An RPAS operator must provide an Operations Manual for the use and guidance of the RPAS operations personnel concerned

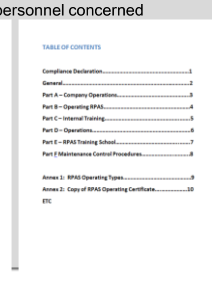

COMPANY LOGO

Company Name

RPAS OPERATIONS MANUAL

Version 1

Date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Chapter 9 – RPAS Operations

RPAS operations considerations

RPAS operations may include, but not be limited to, the following:

- VLOS operations
- night VLOS operations
- beyond VLOS operations
- populated areas
- take-off/launch/landing/recovery
- launch/recovery equipment preparation/set-up/inspection
- special operations

Chapter 9 – RPAS Operations

Emergencies and contingencies

RPAS flight planning should include provisions for any emergencies and contingencies for:

- emergency landing/ditching locations
- loss of C2 link
- interception operations

Chapter 9 – RPAS Operations

Other requirements for consideration

- RPA performance and operating limitations
- accident and incident investigation
- security
- cargo safety

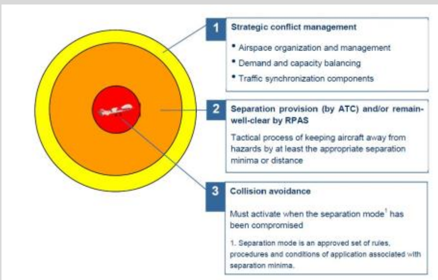
Chapter 10 – Detect and Avoid (DAA)

Fundamental requirements

- Detect and avoid (DAA) – "the capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action"
- remain well clear (RMC) to avoid potentially conflicting traffic;
- to be as safe as, or safer than, present manned operations;
- DAA capabilities are required for RPA to limit the risk of integration into non-segregated airspace
- must comply with airspace rules and procedures;
- safety analysis/mitigation strategies may be required.

Chapter 10 – Detect and Avoid (DAA)

Protection layers



RPAS Manual. Fig 10-1 Protection layers

Chapter 11- Command and Control (C2) Link

RPA are piloted from an RPS utilizing a command and control (C2) link.

- a C2 link allows full manipulation of the RPA controls
- all non payload information to and from remote pilot and the RPA is via the C2 link
- commands from the remote pilot to the RPA are real time minus latency

Chapter 11- Command and Control (C2) Link

Spectrum for the C2 link

- spectrum for international operations is being worked jointly by ICAO and the ITU
- for domestic operations, local solutions may be available if they do not impact other spectrum dependent uses
- different spectrums are utilized by video, voice and C2 that may be subject to licensing by the State

Chapter 11- Command and Control (C2) Link

Required communication performance (RCP) of the C2 link

- The RCP type parameters for the specific type of operation may include:
  - transaction time
  - integrity
  - continuity
  - availability
- RCP will be a part of the system performance

Chapter 11- Command and Control (C2) Link

C2 link architecture

C2 link architecture to support RPAS operations are usually classified as RLOS or BRLOS.

- RLOS refers to the situation in which the transmitter(s) and receiver(s) are within mutual radio link coverage

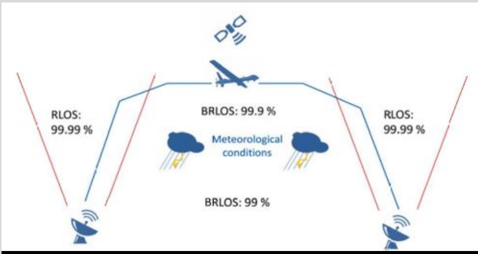
RPAS Manual. Fig 11-1 RLOS – RPS and RPA direct access

- BRLOS refers to any configuration in which the transmitters and receivers are not in RLOS. BRLOS includes all satellite systems

RPAS Manual. Fig 11-2 BRLOS – RPS and RPA via satellite access

Chapter 11- Command and Control (C2) Link

links are not 100% reliable, they are subject to interference (intentional or unintentional , e.g atmospheric conditions) equipment failure etc. Procedures for handling lost C2 link will be addressed



RPAS Manual. Fig 11-3 Example availability of the C2 Link

Chapter 12 – ATC Communications

- general requirements for ATC communications, to and from the remote pilot, are the same as for manned aviation
- because the remote pilot is not on board the aircraft, a range of alternative communication architectures are possible

Chapter 12 – ATC Communications

- ATC voice and data link communications architecture options:

Voice and data TO/FROM the RPS, relayed via the RPA

Chapter 12 – ATC Communications

- ATC voice and data link communications architecture options:

ATC voice and data TO/FROM the RPS without a relay via the RPA

Chapter 13 – Remote Pilot Station - RPS

RPS : "the component of the remotely piloted aircraft system containing the equipment used to pilot the remotely piloted aircraft."

- the specific shape, size, contents and layout of any RPS may vary due to aspects such as:

  a) the type of operation conducted (VLOS or BVLOS)
  b) the complexity of the RPAS
  c) the type of control interface used
  d) the number of remote pilots required to operate the RPA
  e) the location of the RPS — fixed position on the ground or within another vehicle/platform (e.g. ship or aircraft).

Chapter 13 – Remote Pilot Station - RPS

The design of an RPS must consider the following:

- layout and identification of controls and instruments
- rapid identification of emergency situations
- remote pilot input on flight controls
- ventilation, heating and noise

Chapter 13 – Remote Pilot Station - RPS

Human performance implications:

- visual sensory information (e.g. light and flash)
- auditory sensory information (noise environment including engine and airframe noise)
- proprioceptive sensory information (e.g. vibration and acceleration)
- tactile sensory information (e.g. heat and vibration)

Chapter 14 Integration of RPAS Operations into ATM and ATM Procedures

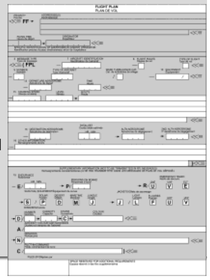
- contains best practices and procedures that can be used for the safe integration of RPAS, taking into consideration the current technological limitations. Operations in segregated airspace are not within the scope of this chapter
- identification of current best practices for consideration by States and aviation standards organizations (e.g. RSOOs, RTCA, EUROCAE)
- operations in non-segregated airspace, controlled and uncontrolled

Chapter 14 Integration of RPAS Operations into ATM and ATM Procedures

- operational and equipage requirements of RPA will be governed by the class of airspace in which they will be operating. Airspace class definitions are defined in Annex 11 — Air Traffic Services

Chapter 14 Integration of RPAS Operations into ATM and ATM Procedures

- right-of-way: RPA are obliged to comply with the Annex 2 right-of-way rules of other aircraft (manned or unmanned)
- RPAS operators will need to file flight plans in accordance with Annex 2 ("ZZZZ" should be entered in item 9 of the flight plan & the RPA type specified in item 18) Did the operator define lost link procedures?
- it may be difficult for ATCOs, pilots of manned aircraft and other remote pilots to acquire visual contact with the RPA due to low conspicuity



Chapter 15 – Use of Aerodromes

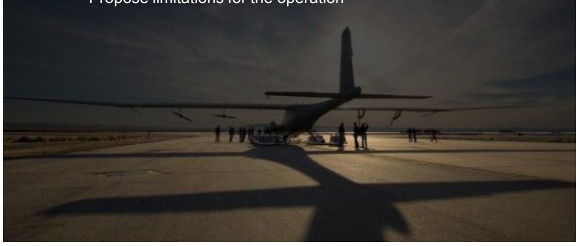
- RPAS integration will require technology sufficient to provide sufficient awareness and resolution to allow the remote pilot to safely operate the RPA and identify, in real-time, the physical layout of the aerodrome and associated equipment, such as aerodrome lighting and markings during operations at aerodromes open to public use

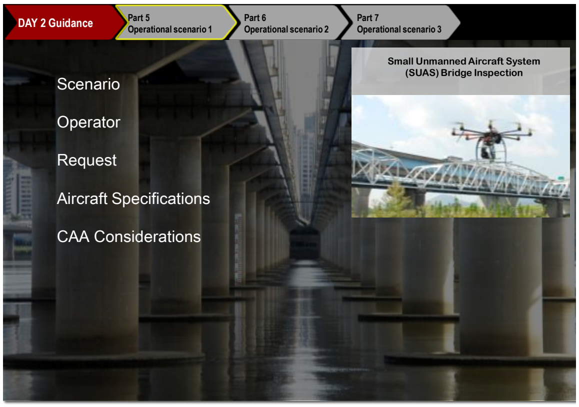
- The RPAS needs to have the ability to communicate and manoeuvre in a manner that will not disrupt routine airport operations
- States may consider establishing aerodromes to serve RPAS operations only

Outline

DAY 2 Guidance | Part 5 Operational scenario 1 | Part 6 Operational scenario 2 | Part 7 Operational scenario 3

- Case study – three operational scenarios
  - Share different regulatory approaches and best practices
  - Propose limitations for the operation

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Operator
Request
Aircraft Specifications
CAA Considerations


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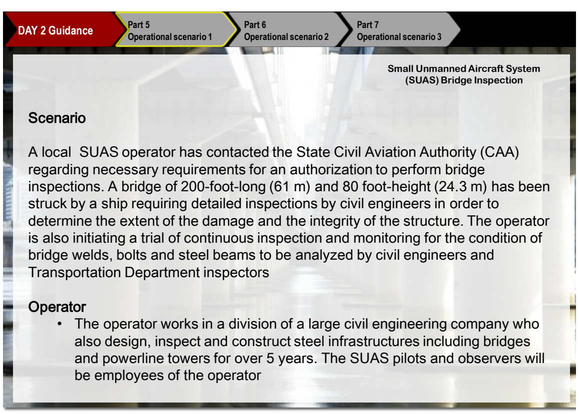
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Small Unmanned Aircraft System (SUAS) Bridge Inspection
Scenario
A local SUAS operator has contacted the State Civil Aviation Authority (CAA) regarding necessary requirements for an authorization to perform bridge inspections. A bridge of 200-foot-long (61 m) and 80 foot-height (24.3 m) has been struck by a ship requiring detailed inspections by civil engineers in order to determine the extent of the damage and the integrity of the structure. The operator is also initiating a trial of continuous inspection and monitoring for the condition of bridge welds, bolts and steel beams to be analyzed by civil engineers and Transportation Department inspectors
Operator
• The operator works in a division of a large civil engineering company who also design, inspect and construct steel infrastructures including bridges and powerline towers for over 5 years. The SUAS pilots and observers will be employees of the operator

DAY 2 Guidance | Part 5 Operational scenario 1 | Part 6 Operational scenario 2 | Part 7 Operational scenario 3

Small Unmanned Aircraft System (SUAS) Bridge Inspection

Request

- guidance from the CAA for the use of SUAS in visual line of sight (VLOS) operations
- all bridge inspection work will be flown under the bridge structure or at least 30 meters horizontal distance from bridge
- environment limited to day only visual meteorological conditions (VMC)
- SUAS aircraft utilized: Walkera Scout X4 with 25 minute endurance and G3 3.8 Pro 1
- flown by licensed remote pilots with valid medical certificates

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Small Unmanned Aircraft System (SUAS) Bridge Inspection

Aircraft specifications - Walkera Scout X4

- Remote control: DEVO F12E FPV Transmitter 2.4 Ghz and Video at 5.8 Ghz
- Support both Apple IOS and Android based devices
- Waypoint mission planning / Designated flight
- Follow Me Mode / Record Track Back To Home
- Hybrid, can be changed from 4 for to 8 motors
- 2.4 Bluetooth datalink ground station (BT-2401A/B FCC / BT-2402A/B CE)
- Flight time: Up to 25 minutes
- Flight range: up to 1500 m
- Receiver: DEVO-RX707(CE) / RX709(FCC)
- Real time flight data (telemetry) monitoring
- Auto return to home (RTH)
- Motors: Brushless WK-WS-34-002
- Battery: 6cell 22.2V 5400 mAh Li-Po
- iPad holder with backup power
- Size: 335x335x275 mm.
- Rotor Blades Length: 233 mm
- Weight with battery: 1770 g
- Flying Weight: <2.27 Kg
- Larger Payload with the ability to carry a wider selection of cameras to be announced

DAY 2 Guidance | Part 5 Operational scenario 1 | Part 6 Operational scenario 2 | Part 7 Operational scenario 3

Small Unmanned Aircraft System (SUAS) Bridge Inspection

CAA considerations

- evaluation of SUAS operations in the transportation infrastructure environment
- authorization for bridge inspection would advance the public interest by providing the CAA with valuable user experience on SUAS command and control in VLOS operations
- initial research efforts are integral to the use of SUAS well beyond those operations that will be conducted by the operator
- if operating directly over travel lanes, the operator will coordinate with the local transportation authority for traffic control and lane closures
- CAA is monitoring the operation
- Transportation Department inspection methods performed in a safe manner without danger to workers in lifts or scaffolding
- analysis of structures performed with greater detail and accuracy in laboratories with SUAS high resolution sensors


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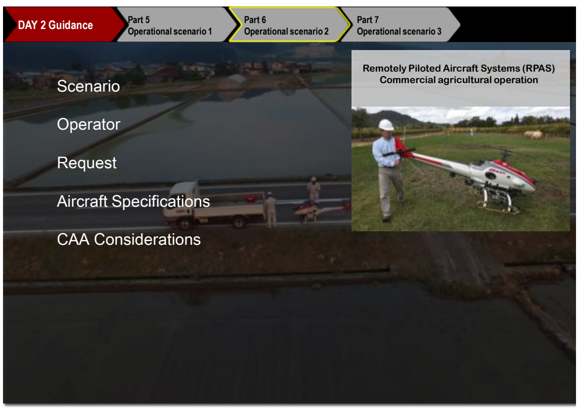
Small Unmanned Aircraft System
(SUAS) Bridge Inspection
Proposed limitations for the operation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Remotely Piloted Aircraft Systems (RPAS)
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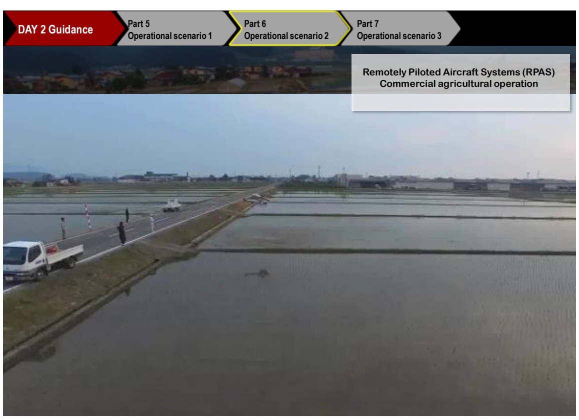
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Commercial agricultural operation

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Remotely Piloted Aircraft Systems (RPAS)
Commercial agricultural operation

Scenario

A consortium of local farmers approached the competent authority to obtain an authorization for its Helicopter RMAX to perform commercial agricultural aircraft operations for several large farms

Operator

- private funded company
- has previous experience in crop dusting operations with manned aircraft
- their operational staff include licensed remote pilots and observers that have been properly trained on the aircraft specifications and perform aerial photography

DAY 2 Guidance | Part 5 Operational scenario 1 | Part 6 Operational scenario 2 | Part 7 Operational scenario 3

Remotely Piloted Aircraft Systems (RPAS)
Commercial agricultural operation

Request

The operator proposes to fly the RMAX RPA to conduct precision agricultural related services in rural areas at altitudes of less than 10 meters above ground level (AGL).
The petitioner intends to conduct agricultural services of spraying, seeding, remote sensing, frost mitigation and variable rate dispersal

The RMAX can also be equipped with sensors and equipment to detect and monitor agricultural areas that require irrigation, fertilization, or other treatments.
Yamaha provides the CAA with following documents as part of their proposal:

- RMAX training program
- Yamaha RMAX Ground Theory Manual
- Yamaha RMAX Operations Manual
- Yamaha RMAX Agricultural Guidebook

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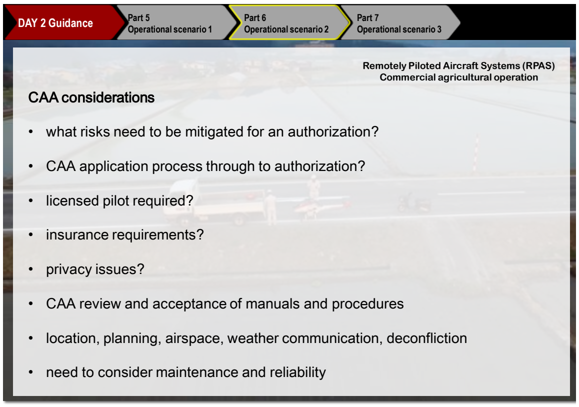
Remotely Piloted Aircraft Systems (RPAS)
Commercial agricultural operation

Aircraft specifications – RMax Helicopter

PERFORMANCE
Load capacity, 28 kg
Practical range, (Visual range) Up to 400 m
Control System, YACS-G (RMAX Type II G) / YMCS (RMAX Type II)
DIMENSIONS
Overall Length, 2,750 mm / 3,630 mm (with rotor)
Overall Width, 720 mm
Overall Height, 1,080 mm
ENGINE
Type, 2-cycle, horizontally opposed 2-cylinder
Starting System, Electric starter
Fuel, Regular gasoline mixed with 2-cycle engine oil

OTHER FEATURES
High performance GPS
In case of Radio interference, the helicopter decelerates quickly
In case of GPS Signal interruption, indicator flashes and helicopter goes into preselected flight mode.
CAMERAS
Fitted with FLIR, and Zenmuse X5 with Lens and focus system, with remote controls.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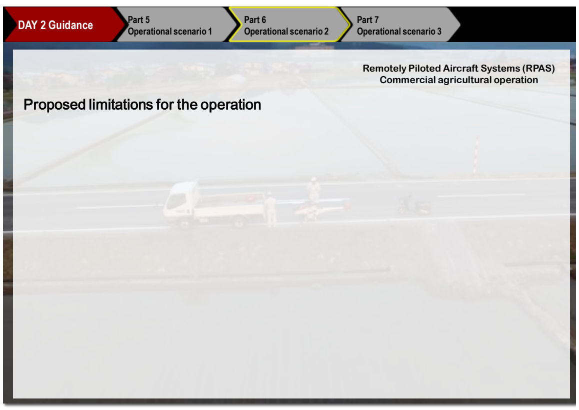
Commercial agricultural operation
CAA considerations
• what risks need to be mitigated for an authorization?
• CAA application process through to authorization?
• licensed pilot required?
• insurance requirements?
• privacy issues?
• CAA review and acceptance of manuals and procedures
• location, planning, airspace, weather communication, deconfliction
• need to consider maintenance and reliability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Remotely Piloted Aircraft Systems (RPAS)
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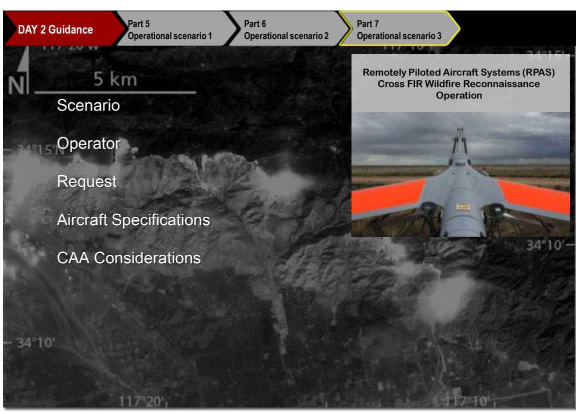
Proposed limitations for the operation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Remotely Piloted Aircraft Systems (RPAS)
Cross FIR Wildfire Reconnaissance Operation
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5 km
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34°10'
117°20'
117°10'

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5 km

Remotely Piloted Aircraft Systems (RPAS) Cross FIR Wildfire Reconnaissance Operation

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Remotely Piloted Aircraft Systems (RPAS) Cross FIR Wildfire Reconnaissance Operation

Scenario

In the summer of 2015, several large wildfires raged across the borders of two small countries requiring that they share support and emergency equipment to maximize their efforts and minimize property loss. A two year local drought, extremely dry weather conditions and high winds pushed the wildfires across mountain ranges and through valleys destroying small towns and valuable crops across both nations

Fire officials stated the 100,000 acres consumed were the largest fire destruction in their States' history and unless they joined forces, the fires would rage uncontained for weeks. The wildfires caused a total of 87 injuries and 2 fatalities primarily from smoke inhalation, in addition to causing at least 67 million (2015 Euros) in damage

Due to budget constraints and lack of availability of accurate satellite surveillance due to heavy smoke, the States' officials passed an emergency resolution to open their sky's borders to emergency operators and to recognize RPAS operations for surveillance in hopes of containing the fires. They also jointly created a Danger Area limiting other civil operations in the airspace.

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Remotely Piloted Aircraft Systems (RPAS) Cross FIR Wildfire Reconnaissance Operation

Scenario (cont.)

Emergency Mission:

The Insitu ScanEagle provided reconnaissance of wildfires in the rugged mountains and valleys of the two nations. After initial flights were flown by a fleet of four ScanEagles providing accurate GIS information to the joint command center, allowed real time mapping of the fires

When coupled with wind information, fire officials were able to deploy bomber and helicopters and to position hotshot firefighters in the most effective manner. Night IFR operations were approved and the ScanEagles were able to utilize infrared sensors to map hotspots

At dawn each day the feedback to the Incident Management team allows relocation and pinpoint bombing of the fire on multiple fronts. The effectiveness of the night operations stops the advancing fire after five days and on the sixth day thunderstorms move into the area soaking the dry terrain and containing the wildfires

DAY 2 Guidance | Part 5 Operational scenario 1 | Part 6 Operational scenario 2 | Part 7 Operational scenario 3

Remotely Piloted Aircraft Systems (RPAS) Cross FIR Wildfire Reconnaissance Operation

Operator

Operator is a service provider to government agencies worldwide for emergency response and monitoring. Aircraft has 900 hours of flight time in this type of operation, all pilots hold RPL certificates with second class medical certificates

Request

To provide its services under the oversight of the Minister or Department of Public Services and the CAA with the necessary requirements to operate according to the national regulations especially in regard the competencies and licensing requirements

DAY 2 Guidance | Part 5 Operational scenario 1 | Part 6 Operational scenario 2 | Part 7 Operational scenario 3

Remotely Piloted Aircraft Systems (RPAS) Cross FIR Wildfire Reconnaissance Operation

Aircraft specifications – Insitu ScanEagle

- can fly at altitudes up to 15,000 feet;
- can feed imagery and other data obtained by the aircraft by satellite into the command center.
- provides a broad overview and systematic surveillance using high-resolution synthetic aperture radar (SAR) and long-range electro-optical/infrared (EO/IR) sensors
- has long loiter times over target areas for more than 20 hours
- the Scan Eagle RPAS configured for fire fighting operations consists of:
  - the remotely piloted aircraft, ScanEagle payload: EO and IR turret and camera;
  - a launcher and Skyhook for recovery.
  - remote pilot station

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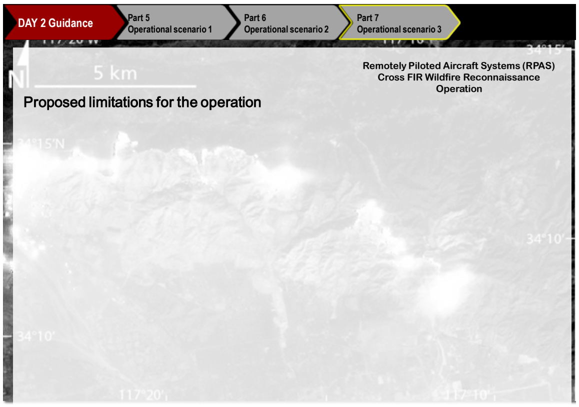
Remotely Piloted Aircraft Systems (RPAS) Cross FIR Wildfire Reconnaissance Operation

CAA considerations

- what is the role of the CAA?
- in a designated danger area, what approval does a civil aircraft require to operate in the area.
- does the ScanEagle requires a type certificate and certificate of airworthiness?
- how will the remote pilots communicate with air traffic control and other aircraft fire bombing on location?
- will the radio frequencies be over crowded?
- what is the nature of the communications links in use?
- what does air traffic control need for the operation?
- if civilian regular public transport (RPT) operations are active in the area of operation, what would need to be done?
- will smoke or temperature be a hazard?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Proposed limitations for the operation
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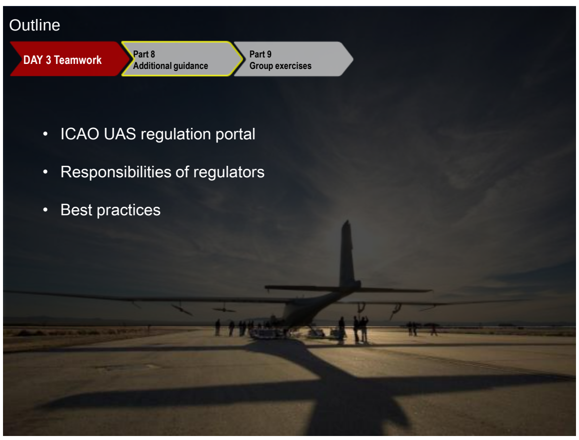
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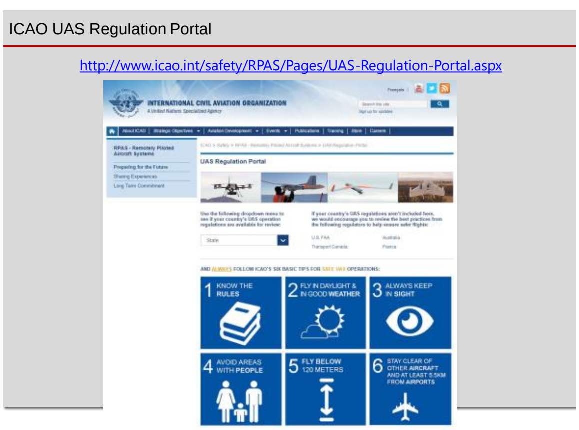
• Responsibilities of regulators
• Best practices


ICAO UAS Regulation Portal
http://www.icao.int/safety/RPAS/Pages/UAS-Regulation-Portal.aspx
INTERNATIONAL CIVIL AVIATION ORGANIZATION
UAS Regulation Portal
1 KNOW THE RULES
2 FLY IN DAYLIGHT & IN GOOD WEATHER
3 ALWAYS KEEP IN SIGHT
4 AVOID AREAS WITH PEOPLE
5 FLY BELOW 120 METERS
6 STAY CLEAR OF OTHER AIRCRAFT AND AT LEAST 5.5KM FROM AIRPORTS

Additional Guidance

Responsibilities of regulators
State of Registry

- certificate of airworthiness
- radio station licence
- issue remote pilot licences*
- assess international safety developments
- encourage high safety standards
- promote consultation and communication with industry/public

* licence may or may not be issued by the State of Registry of the RPA

Additional Guidance

Responsibilities of regulators
State of the Operator

- issue RPAS operator certificates (ROC)
- safety standards development
- conduct surveillance
- identify safety trends and risks
- issue remote pilot licences *
- assess international safety developments
- encourage high safety standards
- promote consultation and communication with industry/public

* licence may or may not be issued by the State of Registry of the RPA

Best practices

Other regulators approach

- FAA proposed framework of regulations would allow routine use of small UAS (under 55 pounds) into the NAS
- EASA ANPA 2015-10 – Introduction of a regulatory framework for the operation of drones
- UK CAP722 - provides the guidance to enable UAS operations to be conducted within the relevant regulations
- CASA (Australia) CASR Part 101 - consolidates the rules governing all unmanned aeronautical activities into one body of legislation

Best practices

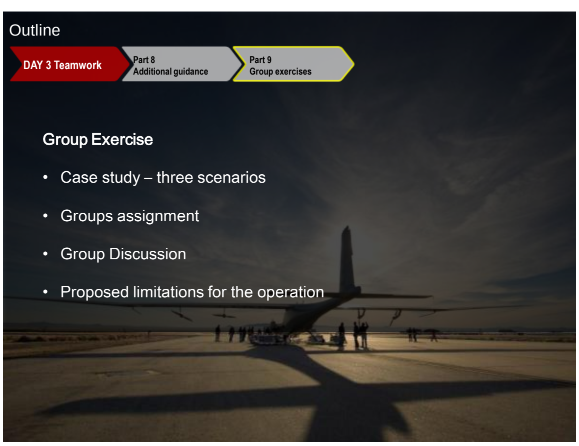
International Organizations

- EUROCAE WG-73; tasked to deliver standards and guidance that will ensure the safety and regularity of UAS missions
  WG-73 works in coordination with RTCA SC-228 MOPS for Unmanned Aircraft Systems
- EUROCAE WG-93 is tasked to develop standards and recommendations for guidance material for the safe operation of Light RPAS
- RTCA SC 228 is developing MOPS for UAS

Best practices

International Organizations

- ISO – ISO is developing UAS design, production, and maintenance standards for power, propulsion, and avionics, as well as for terminology and operations
- Joint Authorities for Rulemaking on Unmanned Systems (JARUS)
  - recommends a single set of technical, safety and operational requirements for the certification and safe integration of UAS into airspace and at aerodromes.
  - provides guidance material aiming to facilitate each authority to write their own requirements and to avoid duplicate efforts



DAY 3 Teamwork | Part 8 Additional guidance | Part 9 Group exercises

Group Exercise

- Case study – first scenario

Flare stacks are structures that serve as safety devices in refineries, oil rigs and at other petrochemical facilities. They burn off excess hydrocarbon gases which cannot be recovered or recycled. Excess hydrocarbon gases are burnt in the flare systems as an alternative to releasing gas directly into the atmosphere. Historically, flare stacks have been inspected by cranes, helicopters or sometimes with scaffolding requiring an expensive shut down of the operation and a dangerous environment for the inspector.

DAY 3 Teamwork | Part 8 Additional guidance | Part 9 Group exercises

Request

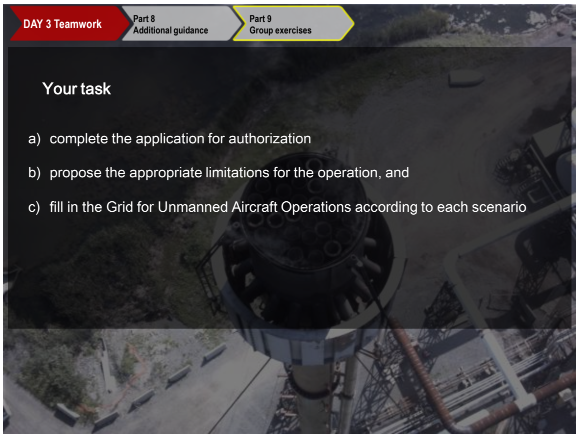
A local UAS operator has contacted the State Civil Aviation Authority (CAA) along with a large petroleum company regarding necessary requirements for an authorization to perform flare stack inspections on their privately owned property. The request includes inspection of 10 flare stacks at their refining plant and at remote drilling operation sites.

DAY 3 Teamwork | Part 8 Additional guidance | Part 9 Group exercises

CAA considerations

- Evaluation of UAS operations for flare stack inspections in a remote, low altitude, VMC, VLOS environment.
- Approval and authorization of UAS flare stack inspections

Note: more details on handout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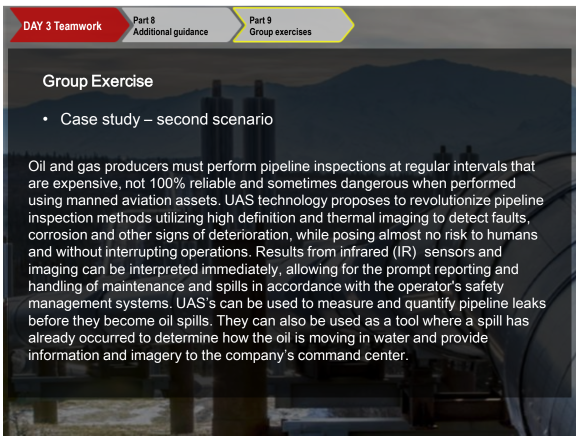
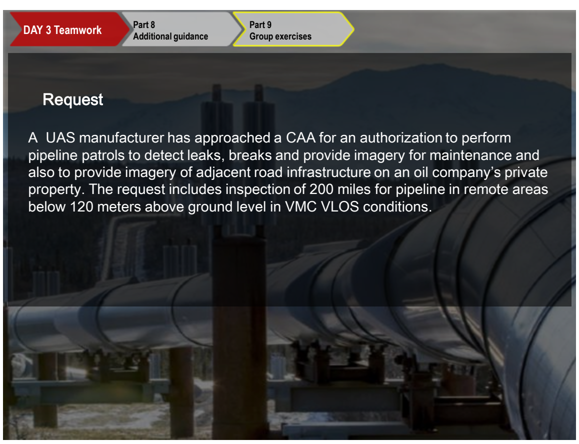
Part 9 Group exercises
Your task
a) complete the application for authorization
b) propose the appropriate limitations for the operation, and
c) fill in the Grid for Unmanned Aircraft Operations according to each scenario


DAY 3 Teamwork
Part 8 Additional guidance
Part 9 Group exercises
Group Exercise
• Case study – second scenario
Oil and gas producers must perform pipeline inspections at regular intervals that are expensive, not 100% reliable and sometimes dangerous when performed using manned aviation assets. UAS technology proposes to revolutionize pipeline inspection methods utilizing high definition and thermal imaging to detect faults, corrosion and other signs of deterioration, while posing almost no risk to humans and without interrupting operations. Results from infrared (IR) sensors and imaging can be interpreted immediately, allowing for the prompt reporting and handling of maintenance and spills in accordance with the operator's safety management systems. UAS's can be used to measure and quantify pipeline leaks before they become oil spills. They can also be used as a tool where a spill has already occurred to determine how the oil is moving in water and provide information and imagery to the company's command center.


DAY 3 Teamwork
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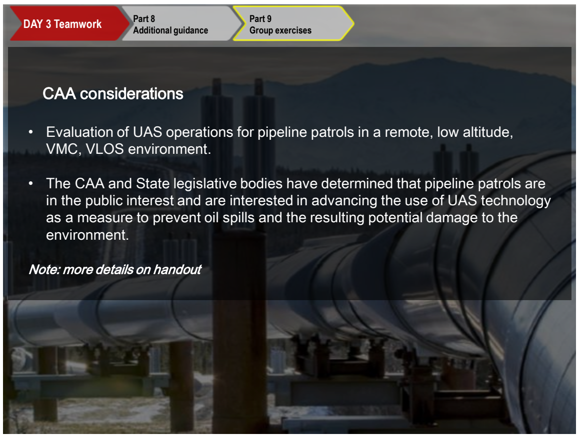
Request
A UAS manufacturer has approached a CAA for an authorization to perform pipeline patrols to detect leaks, breaks and provide imagery for maintenance and also to provide imagery of adjacent road infrastructure on an oil company's private property. The request includes inspection of 200 miles for pipeline in remote areas below 120 meters above ground level in VMC VLOS conditions.


DAY 3 Teamwork
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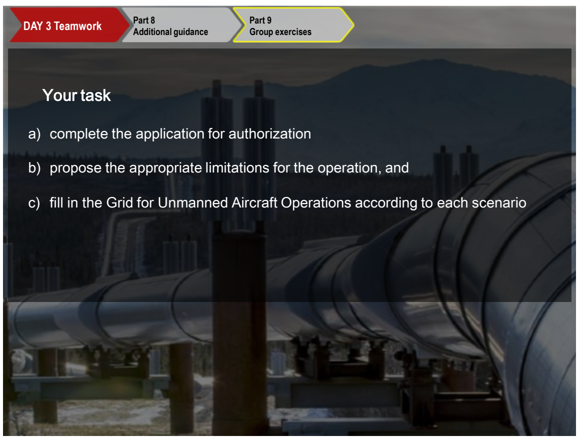
Group exercises
CAA considerations
• Evaluation of UAS operations for pipeline patrols in a remote, low altitude, VMC, VLOS environment.
• The CAA and State legislative bodies have determined that pipeline patrols are in the public interest and are interested in advancing the use of UAS technology as a measure to prevent oil spills and the resulting potential damage to the environment.
Note: more details on handout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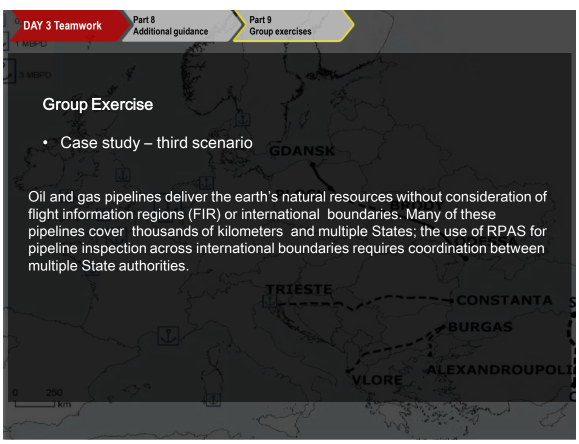
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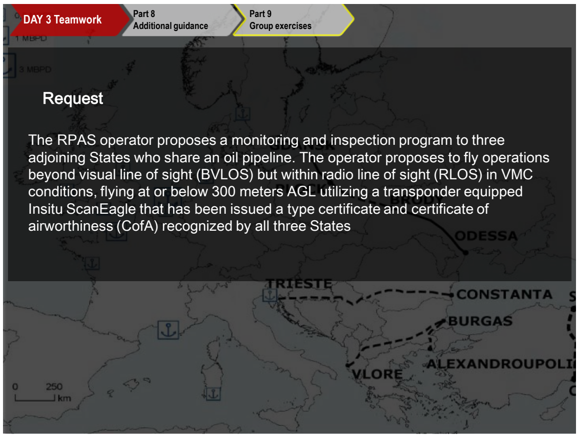
Part 8
Additional guidance
Part 9
Group exercises
Group Exercise
• Case study – third scenario
Oil and gas pipelines deliver the earth's natural resources without consideration of flight information regions (FIR) or international boundaries. Many of these pipelines cover thousands of kilometers and multiple States; the use of RPAS for pipeline inspection across international boundaries requires coordination between multiple State authorities.
GDANSK
TRIESTE
CONSTANTA
BURGAS
VLORE


DAY 3 Teamwork
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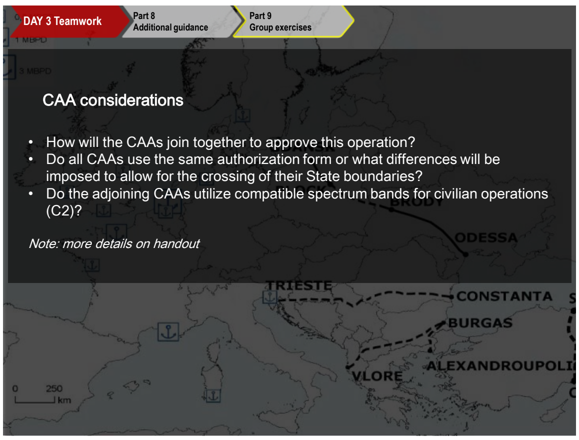
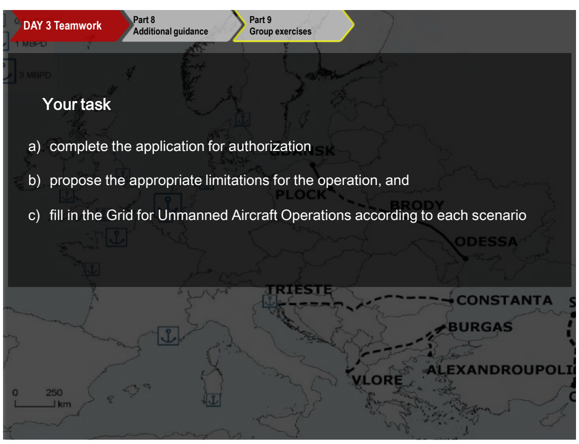
Request
The RPAS operator proposes a monitoring and inspection program to three adjoining States who share an oil pipeline. The operator proposes to fly operations beyond visual line of sight (BVLOS) but within radio line of sight (RLOS) in VMC conditions, flying at or below 300 meters AGL utilizing a transponder equipped Insitu ScanEagle that has been issued a type certificate and certificate of airworthiness (CofA) recognized by all three States
ODESSA
TRIESTE
CONSTANTA
BURGAS
VLORE
ALEXANDROUPOLI
0 250 km


DAY 3 Teamwork
Part 8 Additional guidance
Part 9 Group exercises
CAA considerations
• How will the CAAs join together to approve this operation?
• Do all CAAs use the same authorization form or what differences will be imposed to allow for the crossing of their State boundaries?
• Do the adjoining CAAs utilize compatible spectrum bands for civilian operations (C2)?
Note: more details on handout
ODESSA
TRIESTE
CONSTANTA
BURGAS
VLORE
ALEXANDROUPOLI
0 250 km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ODESSA
TRIESTE
CONSTANTA
BURGAS
VLORE
ALEXANDROUPOLI
0 250 km

Group Exercise

Groups assignment

- each group will be assigned to one of the variables of the case study.
- template to be used is included in the memory stick that has been distributed to the participants on the first day of the workshop.
- cross-reference grid and the RPAS Manual are also available in a hard copy version for group discussion.
- results of the exercise will be presented in plenary by a rapporteur elected in each of the groups for general discussion.

Take aways

- Unmanned industry is rapidly evolving
- The complexity of unmanned aviation will challenge the traditional aviation regulatory system
- States are encouraged to establish and adopt performance based procedures to properly regulate
- Need to establish a constant information exchange between States, industry and other stakeholders
- Feedback to ICAO including best practices and data