

#### **REGIONAL FOCUS**

## Emergence of Remotely Piloted Aircraft Systems, ATM Integration, Benefits and Hazards in Africa

Part 1 - Awareness

**Tuesday 24 August 2021** 12:00 – 14:00 CAT



canso.org





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Director Africa Affairs

CANSO





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#### Mr. Francis Kigen

Senior UAS Inspector Kenya CAA



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Director Air Navigation Services

Rwanda Airports Company



#### Mr. Shukuru Nziku

Principal Air Traffic Management Officer Tanzania CAA



#### Mr. Kokouvi Atchrimi

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#### Ms. Ruby Sayyed

Head of ATM Advocacy





### Mr. Raynold Senam Atadja

Coordinator of the National RPAS Implementation

Ghana CAA



## Emergence of Remotely Piloted Aircraft Systems

## Integration, Benefits and Hazards in Ghana



BY: RAYNOLD SENAM. K. ATADJA COORDINATOR, GHANA NATIONAL RPAS COMMITTEE



### Timeline of RPAS Regulatory Framework in Ghana





## **Approval of RPAS Operations**

SPECIFIC OPERATIONS RISK ASSESSMENT (SORA)

ASSESSMENT OF RISKS FOR RPAS OPERATIONS METHODOLOGY (ARRO)

ALL ENCOUNTERS - CATASTROPHIC



## **Approval of Commercial Operations**





**RPAS** 

PERSONNEL





## Safety & Security Threats from RPAS OPS





## **3-Year Strategic Plan**

#	Strategic Goal	From	То
1.	SMS Implementation for RPAS Certified Operators	15-JUN-2021	06-MAY-2022
2.	Enhance small and light non-commercial RPAS operational compliance	15-JUN-2021	28-APR-2022
3.	Designating RPAS Airspace	05-JUL-2021	12-MAY-2022
4.	Reviewing RPAS regulatory documentation <sup>1</sup>	13-MAY-2022	27-APR-2023
5.	Improve RPAS test standards	16-SEP-2022	30-MAR-2023
6.	RPAS flight monitoring	16-SEP-2022	07-MAR-2024
7.	Qualification of Inspectors on RPAS	28-APR-2023	28-MAR-2024



## SEGREGATION

# Operations below 400 ft A.G.L.

# VLOS above 400 ft A.G.L.

## INTEGRATION

### **BVLOS Operations**

Website: www.gcaa.com.gh Email: info@gcaa.com.gh Phone: 233 30 2776171

VS



### **Benefits to Ghana**











#### Mr. Eustache Karagire

Director Air Navigation Services Rwanda Airports Company



## EMERGENCE OF REMOTELY PILOTED AIRCRAFT SYSTEMS ATM INTEGRATION, BENEFITS ANS HAZARDS IN AFRICA







## INTRODUCTION

- Rwanda long term vision integrates innovation as a problemsolving way to produce solutions that positively impact the masses in delivering timely and efficiently services.
- Huge investments have been directed at Rwanda Aviation Industry especially in digitilazation and integrating technology in every segment by ensuring safety and efficiency service delivery.
- Rwanda became the first country in the world to use drones to deliver blood, When the Government entered into a partnership with Zipline in 2016.
- Rwanda organized in February 2020 in Kigali, Rwanda the African Drone Forum 2020 to create a broad stakeholder platform to advance the equitable and safe development of drone economies in Africa. The Forum which had three components: Symposium, Flight competition and Exhibition.



## OPPORTUNITY, BENEFITS AND HAZARDS IN AFRICA

- Emerging Technologies to prioritize Drones on the Horizon as one of three key emerging technologies for African Development
- Survey and mapping applications via drones are already having an impact on the continent
- Use of Unmanned Aircraft Systems for teaching activities during this pandemic COVID-19 period
- Market services in land digitization and tenure, agriculture and precision farming, infrastructure and construction monitoring, as well as disaster risk management, are well established and demand is accelerating.
- New applications have emerged involving the combined use of drone surveys and artificial intelligence have been piloted across Africa on projects for disease surveillance, urbanization tracking, and flood impact assessment.
- Cargo drones is to speed up deliveries faster, more direct, less polluting, and day or night operation
- Enable a greener transportation sector with costs reducing to 1 cent per kilo per kilometer and zero emissions.
- Job creation. More Drones in the Sky and more Benefits on the ground

## **RPA CHALLENGES**



- No ICAO standards regarding RPAS. Fragmented regulatory framework
- The absence of pilot on board brings the challenges of matching the ability of seeing and avoid
- The rapid proliferation of potential risk collision threat to general and commercial aircrafts.
- Multiple missions specific platform when in flight including unwanted associated to national security or privacy property
- Demonstrate explosive growth with no sign of slowing
- Resistance to change and slow pace in innovation
- Lack of technology testing platform and framework



## **RWANDA CASE**

### Policy & Regulation

Rwanda was the first country to adopt performance-based regulations for all RPAS and probably the first national government to implement unmanned traffic management as a key enabler to operating drones at scale to help civil drones realize their full potential

### Safety & Quality Management System

Effective safety and quality management was put in place to assess operation, collect, process and report any incident/accident and shared with other stakeholders

### **Operations continued even during COVID-19**

As the coronavirus spreads, in the middle of the coronavirus pandemic where lock-downs have made travel and personal contact difficult, there was no interruption of delivery system allowing transport of blood, tests quickly and thereby keep a close eye on who may be at risk (vulnerable, chronically ill patients).



## RWANDA CASE (Cont'd)

### **QRPAS & ATM Technology**

- Aerodynamic RPA structure
- PRAS Portal: Registration, Identification, Authorization and notification to stakeholders
- RPAS Network platform internet-based communication between ATC and RPAS owners and operator (Voice & Data/Flight plan)
- PRAS in flight situation awareness, Identification, tracking for beyond line of sight
- Separated ATM and UTM systems
- Recording and Playback System
- Future Integrated ATM with UTM systems
- Ongoing detect, identification and disrupt



## RWANDA CASE (Cont'd)

### Continued Engagement with Stakeholders & Industry

- Collaborative working relationships with the stakeholders and industries
- Working with industry to collect and use UAS operational data to identify safety risks, and then develop and voluntarily implement mitigation strategies to address identified risks
- Innovation and technology testing
- Organizing forums (symposium, flying competition, exhibition) to gather different partners
- Identifying appropriate technology used for RPAS owner operation improvement, ATM system for detection, traffic management, route & airspace planning.



## RWANDA CASE (Cont'd)

### **Continued Engagement with Stakeholders & Industry**

- Collaborative working relationships with Government, non government, manufacturers, operators, industries and individual consumers
- Joint participation of neighboring ATC units during close border RPAS operation
- Working with industry to collect and use UAS operational data to identify safety risks, and then develop and voluntarily implement mitigation strategies to address those risks
- Innovation and technology testing
- Organizing forums (symposium, flying competition, exhibition) to gather different partners
- Identifying appropriate technology used for RPAS owner operation improvement, ATM system for detection, traffic management, airspace planning, flight routes approval and citizen concerns solutions

### CANSO

## WAY FORWARD

- Government willingness and political commitment
- High Level Decision Makers involvement at national level
- Legislative & Policy that embraces innovation as enabler for sustainable development;
- Innovative domestic regulation through
- Establish a strong safety & quality management principles in general and particularly for UAS;
- Put in place infrastructure network with associated digitalization solutions to improve data exchange as well as service delivery through national interconnected and regional integrated
- Conducive environment for industry to conduct R&D and test prototypes.

## THANK YOU



SHAPING OUR FUTURE SKIES





### Mr. Francis Kigen

Senior UAS Inspector

Kenya CAA



### **UAS PRESENTATION**

## MANAGEMENT OF RPAS IN KENYA AIRSPACE

## **REGISTRATION OF ALL UAS**

- The Authority started Registration of all UAS in Kenya
- Introduction of online registration system
- -Each UAS is allocated a unique identity starting with 5Y-
- All UAS are required to display the unique number on the UAS
- No Kenya UAS will be allowed to fly without being registered only those which will be operating under temporary import permit.

### TRAINING REQUIREMENT FOR ALL UAS OPERATORS

- The Authority has approved so far 5 training institutions
- All UAS operators are suppose to train and acquire either:
- Remote pilot licence or
- Remote pilot certificate

## **UAS OPERATION**

#### **Category A Operations (Low Risk)**

1. All operations under this category shall be approved/authorized by the Authority. Such operations shall only be conducted within Visual line-of-sight (VLOS).

2. UAS operated in this category shall not be more than 25kg maximum take-off mass together with associated payloads.

3. Such operations shall be conducted within segregated airspaces and away from any notified prohibited, restricted and/or danger areas unless expressly authorized by the Authority.

4. UAS operators in this category shall possess a certificate issued by the Authority permitting them to conduct operations

#### **Category B Operations (Medium Risk)**

UAS operations in this category shall be operated within visual line of site (including extended visual line of site) at all time and heights above ground and distances from any persons, buildings or objects not associated with the operations as may be determined by the Authority.

All operations under this category shall be approved/authorized by the Authority. UAS operated under this category may be operated in non-segregated airspaces but away from controlled airspaces and shall have all such equipment as necessary to ensure the safe and secure operations

### **CATEGORY C OPERATIONS**

**Category C Operations** (High Risk/Manned Aviation Approach). This Category of operations poses high risk to safety of individuals, property and manned aviation.

## CONTROLLED AIRSPACE

### **Controlled Airspace**

• No UAS shall be operated in controlled airspace except if approved by the Authority.

### AUTHORIZATION OF UAS

-The Authority shall issue Authorization for each operation after each application is analysed based on the risk it may pose.

 Each Authorization will be considered based on the qualification of the UAS operator especially in controlled airspace the operator must have radio telephony qualification.
The Authority may from time to time determine additional requirements and specifications for operations in each category.

## EXPERIENCE

- To properly manage the Airspace the UAS operators must receive relevant training
- All airspace users must abide by the rules to minimize the risk.
- Airspace integration must involve all the users
- Proper coordination is required in areas where airspaces are shared between manned aircrafts and UAS.
# THANK YOU

Any Questions... Just Ask!







#### Mr. Shukuru Nziku

Principal Air Traffic Management Officer

Tanzania CAA



# RPAS OPERATIONS IN TANZANIA

### By Shukuru Nziku Principal Air Traffic Management Officer



# Today's talk summary

- ✓ What is Remotely Piloted Aircraft System (RPAS)?
- ✓ Current uses of RPAS in Tanzania
- ✓ Management of RPAS Operations in Tanzania
- ✓ Challenges of Integrating RPAS operations into ATC
- ✓ Way forward



a remotely piloted aircraft, its associated remote pilot station(s), the required command and control links and any other components as specified in the type design. (ICAO Doc 10019)

#### Types of RPAS

- ✓ Multirotor
- ✓ Fixed Wing
- ✓ Hybrid
- ✓ Ornithopter







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# Current uses of RPAS in Tanzania

- ✓ Leisure,
- Mapping,
- ✓ Arial photographing and film making,
- ✓ Monitoring and Inspection,
- ✓ Agriculture spraying pesticide
- ✓ Research activities





#### 1. Civil Aviation (Remotely Piloted Aircraft systems), Reg 2018

- Part i Preliminary provisions
- Part ii Categorization and registration
- Part iii Operation of RPAS
- Part iv Commercial operation of RPAS
- Part v Private, recreational and sports RPAS operations
- Part vi Autonomous RPAS
- Part vii Security requirements for RPAS operations
- Part viii General provisions



#### 2. RPA sensitization Programmes

 4 workshops have been conducted so far to stakeholders and security organs

# 3. MOU between Police Tanzania and TCAA on enforcement of regulations.



#### 4. Registered RPA



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#### **5. RPAS Operation permit**

Number operation permits issued - 96

#### 6. RPAS Import permit

Number of RPAS import permit issued - 51

#### 7. Licensing of RPAS Pilots

Number of issued RPAS pilots licences -14



#### 8. Training of RPAS pilots

CATC in collaboration with Prowings Ltd of South Africa



S/N	Course Number	Course Dates	Number of participants
1	DPT 01	04 January 2021 to 29 January 2021	21
2	DPT 02	18 January 2021 to 12 February 2021	15
3	DPT 03	01 March 2021 to 19 March 2021	13
4	DPT 04	15 March 2021 to 09 April 2021	11
5	DPT 05	14 <sup>th</sup> June 2021 to 09 July 2021	10
		TOTAL	70



#### 9. RPAS operating limitations (Reg 23)

(1) A person shall not operate a RPAS above **400 feet Above Ground Level** and within the radius of 50 meters of any person, vessel, vehicle or structure which is not under the control of the person in charge of the RPAS.

(2) Notwithstanding sub regulation (1), operations for private and commercial categories of RPAS may be conducted at such higher heights and lateral distances as the Authority may approve.

(3) A person shall not operate a RPAS;

(a) in conditions other than Visual Meteorological Conditions (VMC); and

(b) beyond Visual Line of Sight (BVLoS).

(4) Notwithstanding sub regulation (3)(b) a RPAS to be operated Beyond Visual Line Of Sight shall be equipped with a detect and avoid (DAA) system.



#### **10. Operation in controlled airspace (Reg 20)**

(1) A remotely piloted aircraft shall not operate in a controlled airspace unless the operator has prior authorization from the Air Traffic Control (ATC) facility having jurisdiction over that airspace.

(2) A remotely piloted aircraft shall only operate at least 10 km away from the centre of any aerodrome.

(3) Any person conducting remotely piloted aircraft operations shall ensure that the appropriate air traffic service unit is advised immediately anytime the flight of a remotely piloted aircraft inadvertently enters into controlled airspace.



#### **11. Operation in controlled airspace**

#### • The process

- $\checkmark$  Receipt of the request for operation from the operator
- ✓ Decide if safety assessment is required
- ✓ Conduct safety assessment
- ✓ Establish Local ATC procedures
- ✓ Issue NOTAM

# Challenges of integrating RPAS operations into ATC

- Technology
  - ✓ Navigation systems
  - ✓ Surveillance systems
  - ✓ ATC communication systems
  - ✓ Command and Control (C2) links
  - ✓ Detect and Avoid (DAA) systems
  - ✓ Geo-fencing
- ATC procedures



Collaboration between RPAS operators, CAA and ANSP



# End of presentation



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#### Mr. Kokouvi Atchrimi

Airport Operations Manager

ASECNA



Agence pour la Sécurité de la Navigation Aérienne en Afrique et Madagascar

# Emergence of Remotely Piloted Aircraft Systems, Integration benefits and Hazards in Africa

# ASECNA's experiences in the management of RPAS





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# INTRODUCTION

- The use of RPAS in ASECNA airspaces has increased considerably in recent years.
- □ Most users are state services to perform aerial work or surveillance.
- □ There is also a significant traffic of RPAS used for military operations.
- some users are private structures whose number is increasing more and more, particularly in the field of service provision.

The use of civil traffic of RPAS is supervised by the Civil Aviation authorities.



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# **ASECNA's experiences in the management of RPAS**

- I. Regulatory provisions on drones in ASECNA states members
- II. The uses of RPAS in ASECNA airspaces
- **III. Management of RPAS in ASECNA airspaces**
- **IV. Safety risk associated with the use of RPAS**

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#### **ASECNA AT A GLANCE**



- Created December 12, 1959
- Headquarters: Dakar, SENEGAL
- 18 Member States
- Multinational Public Institution
- 6 FIRs
- Airspace; 16.1 million square km



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# **States regulatory provisions**

- Few ASECNA States Member have regulations on RPAS.
- Provisions of ICAO Documents and Circulars are applied.





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# States regulatory provisions

- The following practical arrangements are in place to manage RPAS:
  - Multidisciplinary committees put in place including CAA, states services, ANSP, Airport manager, etc.
  - Before each official use of drones, a technical meeting, bringing together the CAA, ANSP and the user is convened;
  - MoU signed between user, CAA and ANSPs

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# The uses of RPAS in ASECNA airspaces





- Civilian uses:
  - Photo, reporting of sporting and other events, aerial work, parcel delivery (VAYA project in Lomé).
  - The activity of RPAs, carried out by professional structures exercising both in civil engineering and in construction, electricity and frequency management is dense by period, and almost non-existent afterwards;
  - Alongside these professional structures, some unknown amateurs working in events also fly RPAS;



# The uses of RPAS in ASECNA airspaces

- Military use:
  - The military also operate RPAS within the framework of national defense, intelligence either in airspaces with special status by issuing NOTAMs or in other airspaces.
  - In countries where there is a multinational force presence (ECOWAS, United Nations, etc.), military drone traffic is very important.

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# **Management of RPAS in ASECNA**

airspaces



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# Management of RPAS in ASECNA airspaces

Civilian uses:

#### the management of RPAS traffic varies from one country to another

#### Example 1:

- The civil professional structures, obtains the necessary authorizations with CAAs and coordinates with ASECNA (focal point or designed Unit) for the management of the requesting flight;
- Coordination is put in place to understand the scope of the activity and a flight schedule including day, time, flight duration and altitude / height;
- Information are communicated to the ATS Units;



# Management of RPAS in ASECNA airspaces

#### Example 1:

- After flight approval, ATC may clear or delay the launch depending on the traffic configuration;
- Each take-off and landing should be coordinated with the focal point (or designed Unit) who immediately transmits the information to the ATC.



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# Management of RPAS in ASECNA airspaces

#### Civilian uses:

#### Example 2:

- Because of their large number on the aerodrome where they are based, RPAS are considered like other aircraft.
- the remote pilot communicates directly with ATC for start-up requests, taxiing until take-off.
- the evolution of RPAS is integrated into the traffic managed by ATC

Periodic meetings are organized between ATC personnel and remote pilots for better collaboration



# Management of RPAS in ASECNA airspaces

#### Military use:

As in the case of civilian use, there are also differences in the management of RPAS military traffic. In most cases, They must:

- Submit a NOTAM request for the period of use of the RPAS specifying the period and altitudes of the flight
- Give to ATC a map of the airspace concerned
- Give, before each flight, the zone and the duration of the course.
- Sometimes, the presence of military in the control TWR is required

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# Safety events involving DRONES



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# Safety events involving DRONES

In 2021, significant safety events were recorded in airspaces and

aerodromes managed by ASECNA.

The Tables below show some of them



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#### **RPAS on approach**

Nb	Description of the event	Likely contributing factor
1	On arrival, the pilot loses control of the DRONE and displays the code 7600 at 24.8 NM from the terrain leaving FL077 in descent. At 01:58, the pilot told the Tower that he was in control of the DRONE and he needed 10 minute for holding. It lands at 02:14	loss of drone control
2	Cleared for landing , the DRONE has interrupted its landing and gone around due to crosswind.	Meteorological conditions
3	Cleared for landing, the DRONE gone around and the pilot reported that he had lost control of the aircraft. A few minutes later, he confirms to the Tower that he has control of Drone again. It proceeded and landed few minutes later.	loss of drone control


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#### **RPAS on landing**

Nb	Description of the event	Likely contributing factor
4	<ul> <li>The RPAS goes around three (3) times because of failed approach</li> <li>for the 1st (at 2:51 am), technical problem</li> <li>for the 2nd (at 3:07 am) and strong wind</li> <li>for the 3rd go-around (at 3:31 am).</li> </ul>	Technical issue and Meteorological conditions



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#### **RPAS Cruising**

Nb	Description of the event	Likely contributing factor
5	<ul> <li>At 4:38 p.m. the RPAS flying F150 at 140NM from the VOR (installed on the aerodrome) signaled a loss of altitude.</li> <li>At 5:08 p.m., it crossed F135 at 94NM descending at 100 ft / min.</li> </ul>	Technical issue and Meteorological conditions
	<ul> <li>The aircraft made an emergency landing at 6:10 p.m. at 35NM from the aerodrome.</li> </ul>	



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#### **RPAS tacking-off**

Nb	Description of the event	Likely contributing factor
6	After take-off, the DRONE turned back for landing due to warning on board.	Malfunction on board



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### CONCLUSION

Aviation must meet the challenge of maintaining the level of safety and adapting to the integration of civilian and military RPAS.

For that :

- □ States should rapidly regulate the use of RPAS on behalf ICAO guidelines;
- There is a need to assess and mitigate safety and security risks associated with the use of RPAS;
- □ There is a need to integrate RPAS with air traffic or to establish segregated airspace ;
- □ ANPS must train their ATS personnel on the management of RPAS
- There is a need to improve Civil-Military Coordination by integrating the risks associated with the use of RPAS.

# THANKS

### QUESTIONS/SUGGESTIONS ?







#### Ms. Ruby Sayyed

Head of ATM Advocacy

IATA

№ 290 member airlines

# representing 82% global traffic

## Why is this a priority?

Airlines are exploring the use of single pilot, remotely piloted/unmanned aircraft, and manned eVTOL for the **air transport of goods and people**.

**Airspace** is a finite resource and to share it safely and efficiently, integration of new entrants is required.

UTM and STM provide an opportunity to **modernize legacy** ATM systems/concepts.



### **IATA** activities



Advocacy

Standard setting

**Products & Services** 





Skills



### Safety



# Framework

# **Educational Videos**



https://www.iata.org/en/programs/safety/drones/





# **100,000** professionals trained annually



## **UAS** Training

IATA has developed a training course focusing on **Safety and Risk Management for Unmanned Aircraft Systems (UAS)**.

Additional **courses** are expected to be launched with more hands-on training for **UA operators**.

There will also be a dedicated training course focusing on how local procedures can be developed by ANSPs and airports to manage events of unauthorized UA. 100,000 Students annually

Courses

5(0)0-

Instructors

420+

**Training partners** 

90+ countries

## Thank you!



https://www.facebook.com/Training.IATA/

https://www.linkedin.com/school/iata-training

https://www.youtube.com/user/IATAtv

https://twitter.com/iata





# **QUESTIONS AND ANSWERS**





#### Mr. Jeoffrey Matshoba

Executive ATM/CNS Planning & Standards

ATNS





#### Ms. Boni Dibate

Director Africa Affairs

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