



canso

Africa Conference 2018

3-5 September, Mombasa, Kenya



ORGANISER



HOST



LEAD SPONSOR



Harmonization Between Emerging Unmanned Aircraft Systems (UAS) and the Existing Manned Aircraft System (MAS)

William Stephen

Flight Operations Developmental Inspector, Tanzania Civil Aviation Authority

ORGANISER



HOST



LEAD SPONSOR



Overview

Introduction

Why harmonization?

How's TCAA implementing harmonization

JNIA case study

TCAA future plan

Conclusion

ORGANISER



HOST



LEAD SPONSOR



Introduction.

UAS, UAV, RPAS, Drones.

- Several terminologies but all reference to one end.
- An aircraft that is flown from a remote location without a pilot being located in the aircraft itself.

ORGANISER



HOST



LEAD SPONSOR



Evolution of names.

Unmanned Aerial Vehicle (UAV)

- Was the original term.
- Is part of UAS components.



ORGANISER



HOST



LEAD SPONSOR



Evolution of names.....

Unmanned Aircraft System (UAS)

- Is accepted term in use today.
- Is now recognized as class terminology by ICAO.
- Is composed by UAV, ground based controller & system of communication between the two.



ORGANISER



HOST



LEAD SPONSOR



Evolution of names.....

Unmanned
Aircraft System
(UAS)



ORGANISER



HOST



LEAD SPONSOR



Evolution of names....

- Remotely Piloted Aircraft System (RPAS)
- Is UAS which is non-autonomous in its capacities.



ORGANISER



HOST



LEAD SPONSOR



Evolution of names....

- Drone
 - Is UAS in relation to military systems especially with weapons carriage capabilities.



ORGANISER



HOST



LEAD SPONSOR



Why harmonization?

- Despite UAS potential threat to all airspace users and its underlying ground, UAS do have safety, security and economic values.
- Safety concern.
Between UAS and MAS.
Between UAS and people and properties on the ground.
Between UAS to UAS.
- Security and privacy concern.
- Increase in volume and dynamic uses of UAS.
- UAS industry perceive airspace usage is on favor of MAS and MAS industry perceive UAS are unsafe in the airspace.

ORGANISER



HOST



LEAD SPONSOR



Why harmonization?....

Story

Meeting with UAS stakeholders in Dar es salaam.

(Representing TCAA Directors)

Confrontation by UAS operators

Advantage my Directors were not there

Disadvantage I had no wingman (no guidance and wisdom)

I took notice to understand their concern and to give them time to calm down

ORGANISER



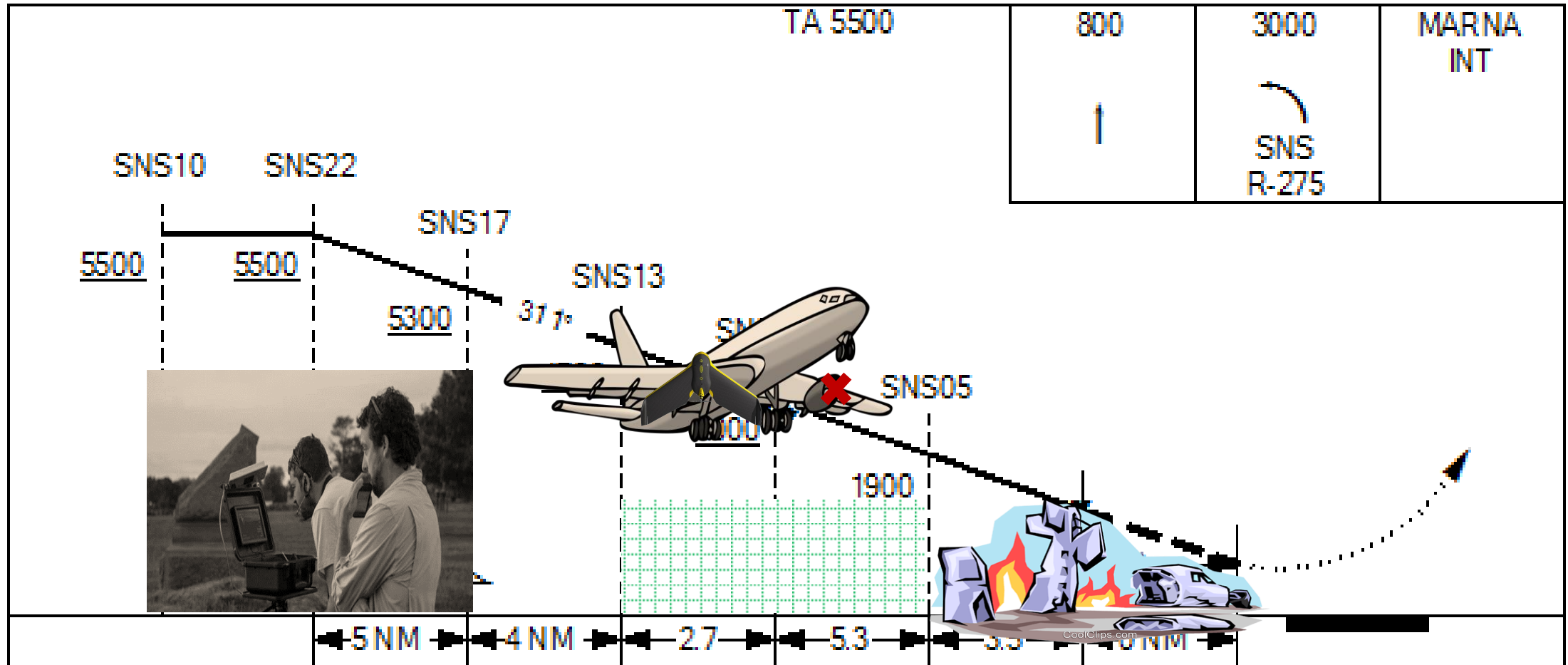
HOST



LEAD SPONSOR



Scenario (Being in the shoes of Regulator)



ORGANISER



HOST



LEAD SPONSOR



Relevance of the scenario to UAS Operators

Logics behind the requirements and procedures necessary for obtain TCAA UAS authorization;

1. Core functions of TCAA “**safety**” especially separation with Manned Aircraft operations.
2. Ministry of Defense for security reasons.
3. Local government Authorities for security reasons and public notification.

ORGANISER



HOST



LEAD SPONSOR



Why harmonization?....

The existing Manned Aircraft ~ (Aviation industry has) its challenges despite its lengthy evolution, advanced technology, cumulative dynamic experience and well established rules and procedures.

DG Hamza (Chairman Canso Africa) mentioned some challenges during 6th Conference opening remarks;

Few which are of concern to UAS operations are;

1. **Communication** – Pilot to Controller, Controller to controller.
2. Airspace separation standards.

Potential Threat ➡ Error

↓
Incident or Accident

↓
Minor damage to Catastrophic

ORGANISER



HOST



LEAD SPONSOR



Threat-Error Management

1. Active

Anticipate – Avoid

(E.g.) Weather avoidance

2. Passive

Trap – Mitigate

(E.g.) Clear air turbulence penetration

Relevance of the above two MAS examples is that do UAS pilots know what, when, where and how to check the weather reports or forecasts and integrate such information to their UAS limitations/operations to ensure safe operations?

ORGANISER



HOST



LEAD SPONSOR



How's TCAA implementing harmonization.

Through guidance and procedures which are;

1. In conformance with ICAO
2. In line with 8 critical elements that establishes TCAA
3. Focusing on TCAA mission (i.e.)
 - Ensuring safety, security, efficiency and regulatory compliance,
 - by providing effective oversight and efficient air navigation services,
 - while maintaining quality, protecting the environment and safeguarding the interest of consumers and the public.

ORGANISER



HOST



LEAD SPONSOR



How's TCAA implementing harmonization...

Critical elements

1. Legislation.
2. Regulations.
3. System and safety oversight functions.
4. Personnel and training.
5. Guidance, tools, safety-critical information.
6. Licensing, certification, authorization and approval.
7. Surveillance.
8. Resolution.

4 Promulgated regulations

ICAO Circular 328
AN/190



5. Guidance, tools, safety-critical information.



1 Aeronautical Information Circular 5/18

2 Authorizations

3 Surveillance

ORGANISER



HOST



LEAD SPONSOR



Aeronautical Information Circular 5/18

 Fax: (255) 22 2844300, 2844302 PHONE: (255) 22 2198100, 2844291 AFS: HTDQYOYO E-MAIL: tcaa@tcaa.go.tz , ais@tcaa.go.tz Website: www.tcaa.go.tz	UNITED REPUBLIC OF TANZANIA TANZANIA CIVIL AVIATION AUTHORITY Aeronautical Information Services Nyerere/ Kitunda Road Junction Aviation House, 1st Floor, P.O. Box 2819, DAR ES SALAAM	AIC 5/18 (Pink 69) 18 JAN
Document No: TCAA/FRM/ANS/AIS-30	Title: AIC	Page 1 of 8

The following circular is promulgated for information, guidance and necessary action

Hamza S. Johari
Director General

UNMANNED AIRCRAFT SYSTEMS

1. GENERAL

- 1.1 This circular is issued for information, guidance and compliance by all concerned while operating in Tanzania. RPAS Operators flying in Tanzania must strictly adhere to minimum requirements set herein and comply with the rules and regulations in the Tanzania Civil Aviation Regulations (TCAR's).

2. OBJECTIVE

- 2.1 The objective of this Aeronautical Information Circular (AIC) is to detail Tanzania Civil Aviation Authority limitations and conditions for the operation of remotely piloted aircraft in Tanzania in accordance with the provisions of International Civil Aviation Organization (ICAO Circular 328 AN/190).

3. POLICY

- 3.1 ICAO Circular 328 AN/190 states that an aircraft capable of being operated without a pilot shall not be so operated except with the authorization in writing of the Authority and in accordance with such conditions as may be specified in the authorization.
- 3.2 In order to facilitate safe operation of these aircraft, certain procedures are to be followed by the prospective operators.
- 3.3 Operations for hire and reward such as banner-towing, advertising, photography, aerial survey, marine survey, agriculture survey, fish spotting, etc., which can be conducted in properly certificated and operated Unmanned Aircraft are not permitted without written permission from the Authority.
- 3.4 Normal airworthiness and operations standards do not apply to **privately operated** Unmanned Aircrafts below 7 kilograms, but must register their drones with the Authority using form TCAA/FRM/SR/OPS - 01 which is attached to this AIC and obtain a written authorization prior to any flights. This includes recreational flying for Unmanned Aircraft below 7 kilograms.
- 3.5 The principle employed by the Authority in granting approvals or specifying requirements is that Unmanned Aircraft operations must not present any undue hazard to other airspace users, or to persons or property on the ground. Any offence against the later, including infringement of personal privacy is an offence of strict liability.

This is a controlled document

ORGANISER



HOST



LEAD SPONSOR



Aeronautical Information Circular 5/18

Found on;

1. TCAA website

http://www.tcaa.go.tz/doc_aic.php

2. TCAA offices

Was made known to public through;

1. Magazine advertisement

2. TCAA website

3. TCAA bulletins

Contents;

ORGANISER



HOST



LEAD SPONSOR



Application process

How UAS applications reach us;

1. Mail

Director General,
Tanzania Civil Aviation Authority
P O Box 2819,
Dar es salaam,
Tanzania

3. Email

tcaa.tcaa.go.tz

3. In hand (Registry office - TCAA HQ)

ORGANISER



HOST



LEAD SPONSOR



Application process...

Application package;

1.Application letter to DG

2.UAS registration form

3.UAS manual

4.Insurance cover

5.Pilot certificate

6.ID

7.Other stakeholders permits e.g. Ministry of Defense
(Commercial UAS operations) and National Park

ORGANISER



HOST



LEAD SPONSOR



Authorization process

Analysis of UAS applications

1. Completeness of application package
2. Who, what, where, when, how
3. Area of operations (block coordinates, route, height above ground level) vs Jeppesen app and Google earth software.

ORGANISER



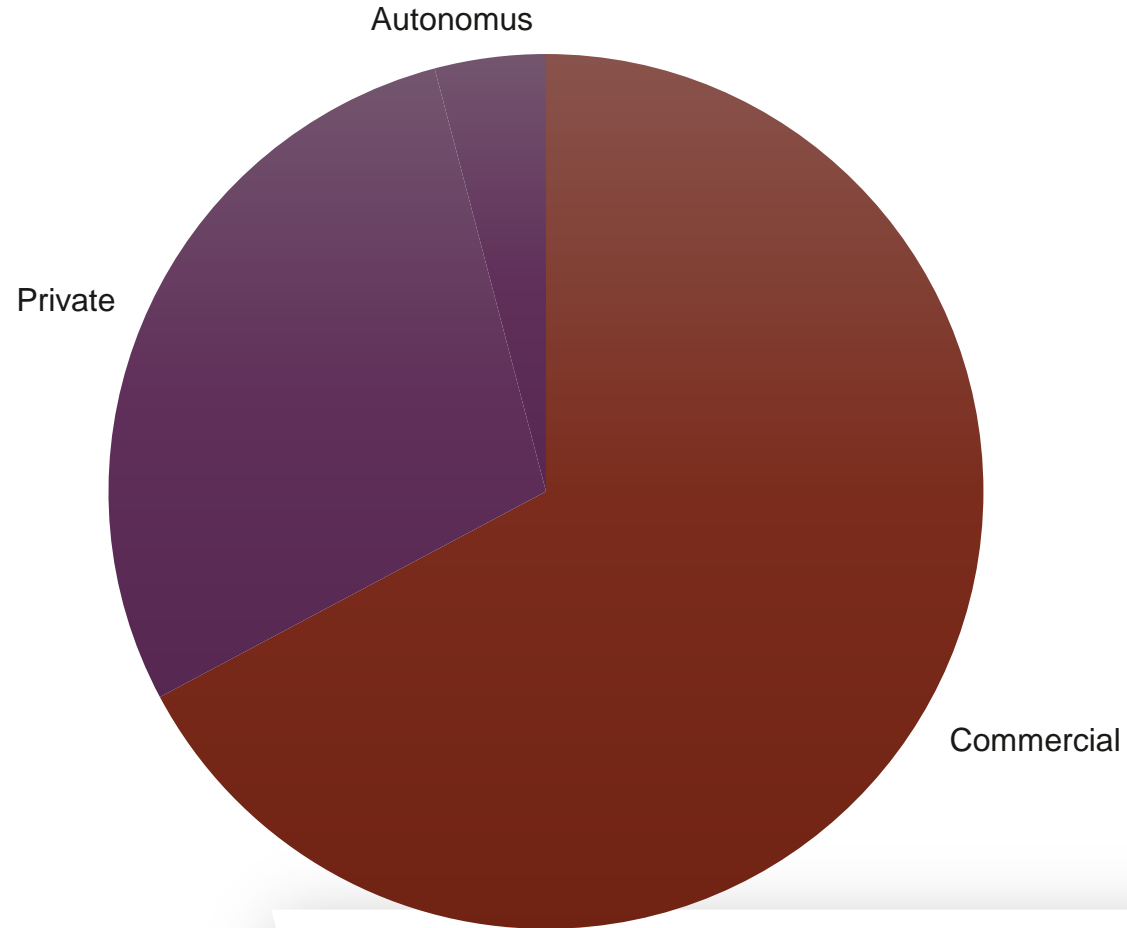
HOST



LEAD SPONSOR



Authorization process....



ORGANISER



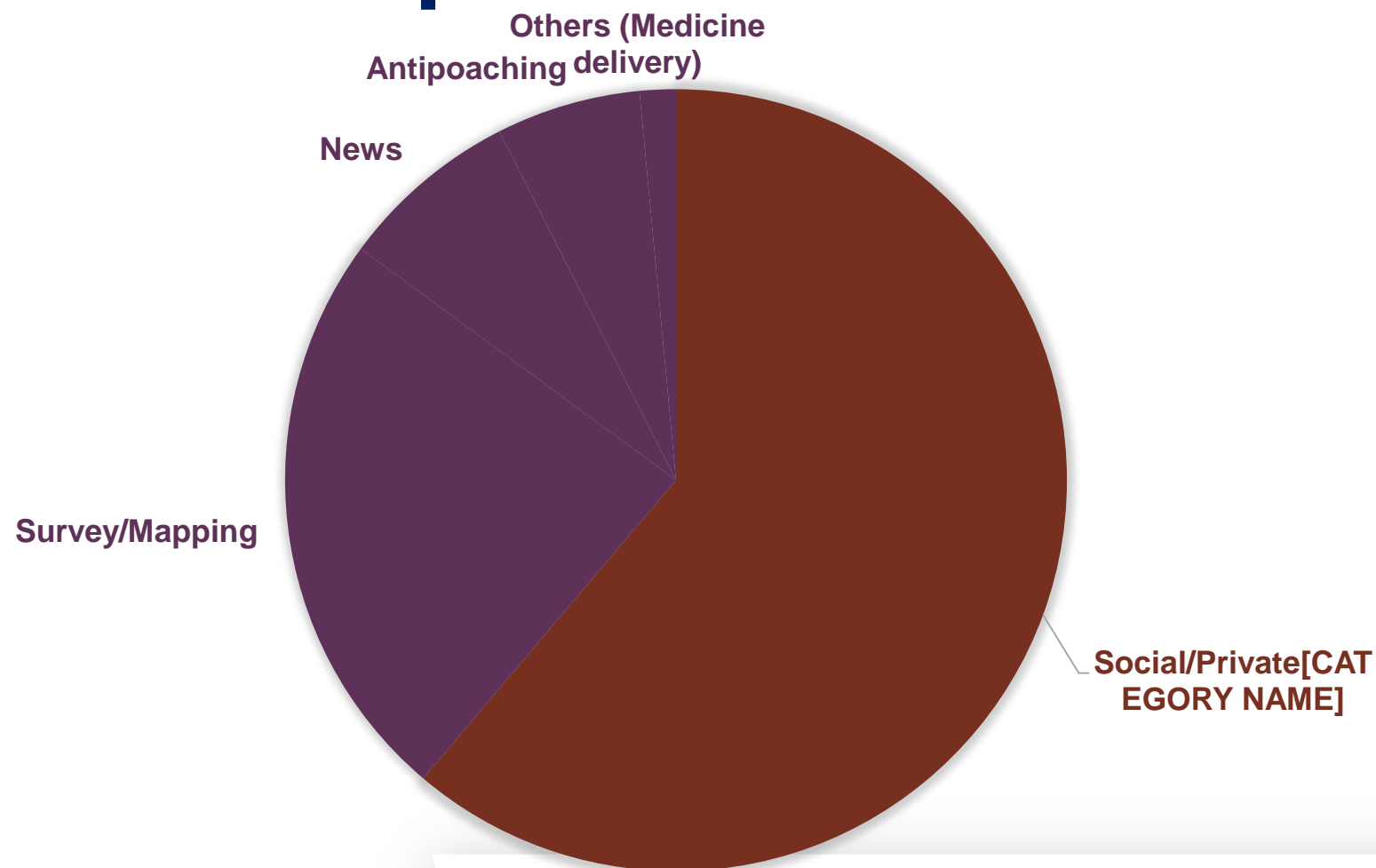
HOST



LEAD SPONSOR



Authorization process....



ORGANISER



HOST



LEAD SPONSOR



Authorization process....

Jeppesen application

1. Radius
2. Block area
3. Route

Google earth software

To confirm what's underneath requested areas

ORGANISER



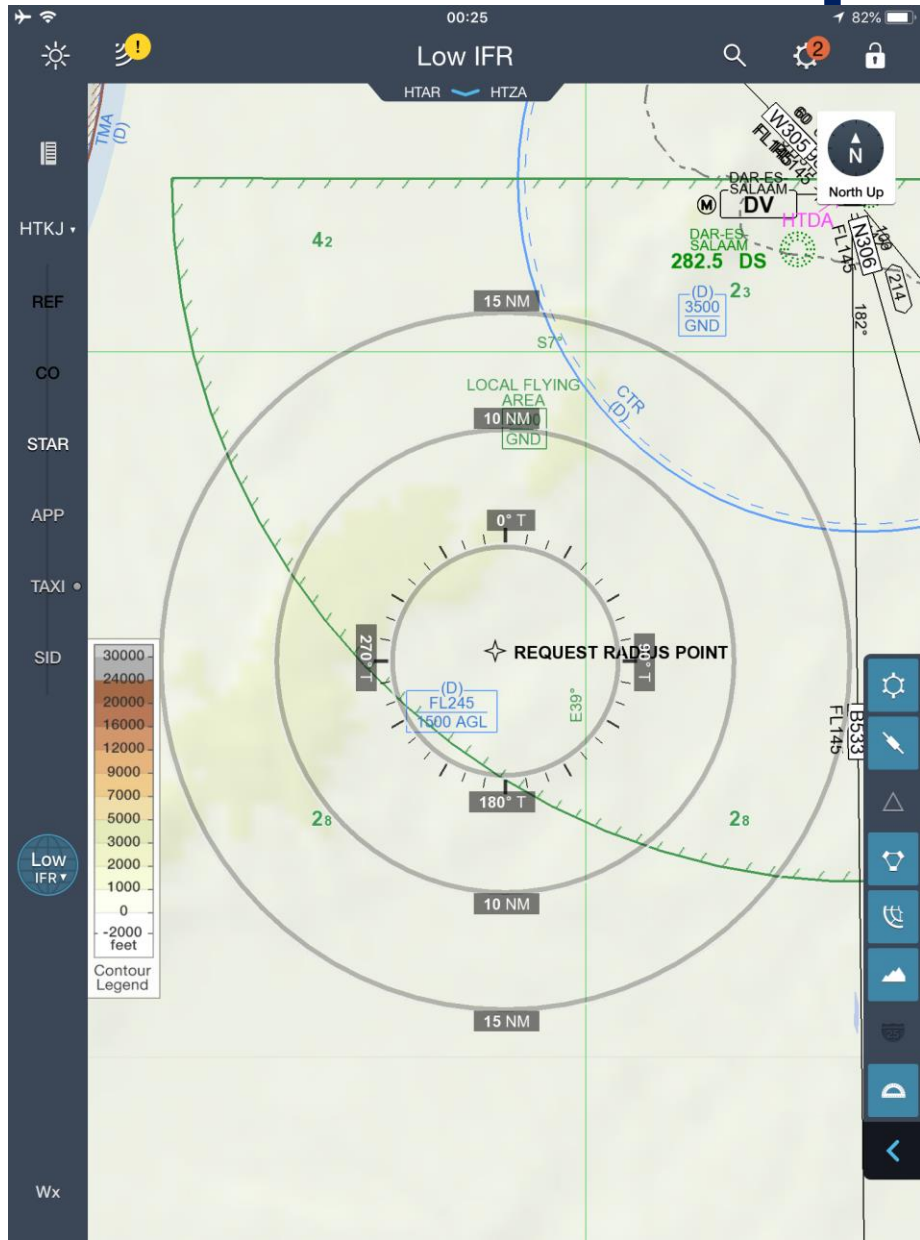
HOST



LEAD SPONSOR



Authorization process



ORGANISER



HOST



LEAD SPONSOR



Authorization process...



ORGANISER



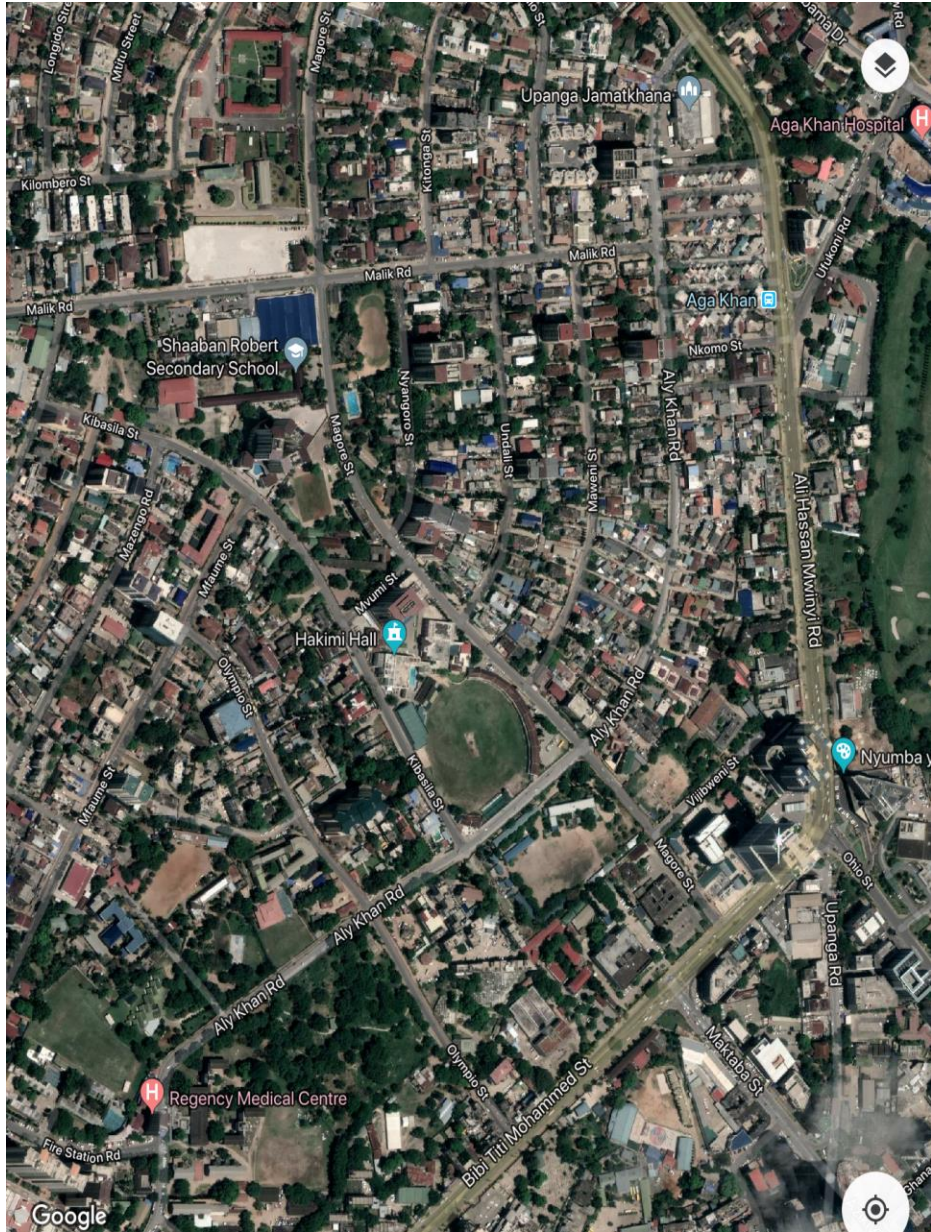
HOST



LEAD SPONSOR



Authorization process....



ORGANISER



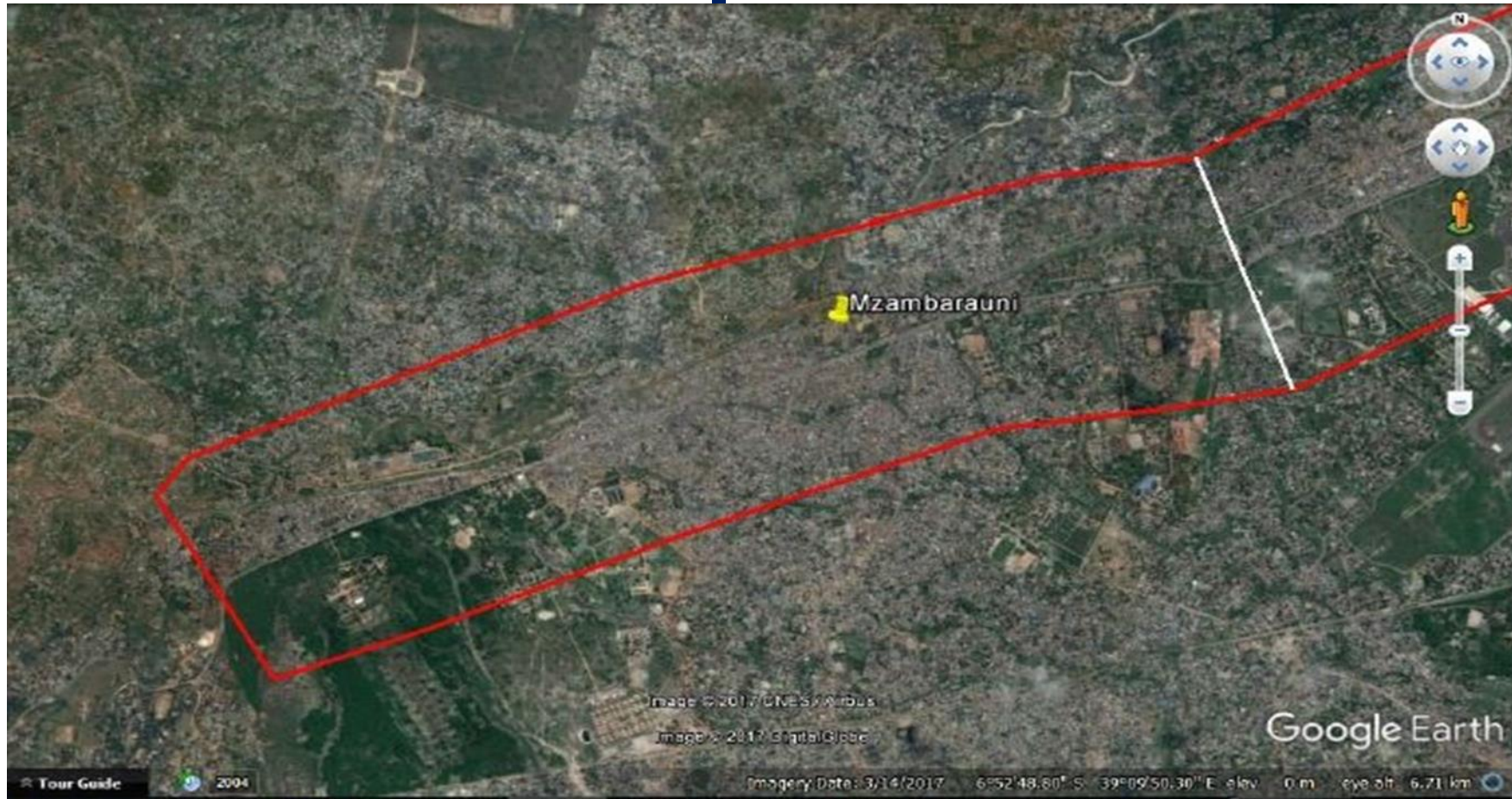
HOST



LEAD SPONSOR



Authorization process....



ORGANISER



HOST



LEAD SPONSOR



Authorization process....

Issuing Authorization

1. Authorized operator/pilot
2. Authorized UAS
3. Adherence to UAS limitations and authorizations limitations and conditions
4. Type of UAS operations VLOS or BVLOS
5. When to operate - Day
6. Type of weather - VMC
7. Lateral limits
8. Vertical limits
9. Controlled airspace avoidance/coordination with relevant ATC unit and issuance of NOTAMs
10. Expiration (Requested timeframe vs MOD permit, Insurance, Pilot Certificate)

ORGANISER



HOST



LEAD SPONSOR



Authorization process....

Challenges

UAS pilots/operator;

1. don't know how and where to check basic weather like wind
2. Are not trained to use AIP (when issuing authorization with airspaces to avoid and their coordinates are on AIP)

ORGANISER



HOST



LEAD SPONSOR



Surveillance

- Actively

Through designation to Civil Aviation Managers
E.g. JNIA case study by Mwanajumaa.

- Passively

Through other Government organs
E.g. Military Officials those who accompany UAS operators

ORGANISER



HOST



LEAD SPONSOR



DRONES OPERATIONS IN AND OUT OF THE AIRPORT VICINITY (JNIA-HTDA CASE STUDY)

Mwanajumaa Kombo

Civil Aviation Manager – JNIA, Tanzania Civil Aviation Authority

ORGANISER



HOST



LEAD SPONSOR



➤ Drones operations in the vicinity of an Aerodrome are considered as safety hazard because they can pose a number of risks to commercial aviation. In order to facilitate these operations and realize its full potential, these risks must be identified and steps must be made to ensure safety so that the drones and commercial aviation can operate together effectively.

ORGANISER



HOST



LEAD SPONSOR



➤ Types of Risks:

- **Safety Risks** – Safety risks to commercial aviation occurs when an incident is caused due to a drone operating in the vicinity of an airport.
- **Security risks** – Whenever there is intent or willful interference with aircraft operation, use of drones for malicious purposes, carrying and delivering explosives, also cyber threats or any use of drone to deliberately endanger aircraft or airports are termed as security risk.
- **Access to airspace** – With drones flying in the same airspace as commercial aircraft, this poses some challenges to overcome. There is a potential for enhanced separation standards to be applied to UAV operations. However, this could have negative consequences related to airspace efficiency, capacity and restricted areas to accommodate UAVs. Any UAVs used must be compatible with established Air Traffic Management procedures or communication, navigation and surveillance requirements. There is a risk to existing airspace users with the operations of UAV into or near established airspace structure which must also be addressed.

ORGANISER



HOST



LEAD SPONSOR



- **Effect on the aviation spectrum** – The increasing use of aviation frequency spectrum to support drone operations should not limit the future need for the spectrum for manned aircraft. But the performance of the C2 Link for UAVs needs to accommodate all ATM requirements, similar to those for manned aircraft. There is some risk associated with using not-protected frequency spectrum for drone operations.
- **Legislation and Regulations** – Lack of harmonized international standards and concepts of operations for drones operations.

➤ **FACTORS TO CONSIDER FOR RISK MITIGATIONS**

- **COORDINATION** –Coordination between Drones Operators, Regulators, Airport Operators and ANS Providers should be established in order to ensure process of permit for drone operations is accepted. The purpose, areas of operations, time and flying limitations must be specified on request.

ORGANISER



HOST



LEAD SPONSOR



- **COMMUNICATION** – Means of communication between Drone Operators and ANS Provider during drone operations must be established. Coordinator to act as a link between Tower controller and drone pilot is required to be positioned at control cabin during the operation.
- **COLLABORATION** – All stake holders should work together in during the operations. Application of operating procedures established for Drone Operators and ANS Provider must be adhered to such as approved routes, flying altitude, operating limitations, etc.

ORGANISER



HOST



LEAD SPONSOR



ACTIONS BY DUTY AIR TRAFFIC CONTROLLER:

Basic Requirement:

Ensure approval has been granted by Regulator and Airport Operator.

Information of Drone operations (Mapping, Coordinates, Time, Altitude etc).

Coordination meeting with drone operator prior to commencement.

Issuance of NOTAM.

ORGANISER



HOST



LEAD SPONSOR



a) Drone operating in the vicinity of aerodrome:

- Maintain two way communication with operator.
- Pass traffic information to other aircraft operating in the vicinity of the aerodrome.
- Flying altitude not above 1000 feet.
- Subject to ATC approval.

b) Drone operating outside the vicinity of aerodrome beyond 15 NM:

- Pass traffic information to other traffic operating in the vicinity.
- Flying altitude not above 1000 feet.
- Subject to ATC approval.

ORGANISER



HOST



LEAD SPONSOR



c) Drone operating outside the vicinity of aerodrome above 1000 feet:

- Activation of zone for duration of its flights. The zone will be restricted to any other civil traffic.
- Subject to ATC approval.

d) Drones operations in Class G airspace at or below 1000 feet:

- Notification to ATC prior commencement and end of drone operation.
- Traffic information to aircraft operating in the vicinity.

ORGANISER



HOST



LEAD SPONSOR



Example: Drone photographing operation at area of Buguruni and Nyerere Road:
Coordinates of area of drone operation:

ZONE	Coordinates of total area	Coordinates from the centre
Zone 1	Lat 6°51'19.57"S , Lon 39°14'27.65"E	Lat 6°50'27.70"S Lon 39°14'34.24"E
Zone 2	Lat 6°51'27.49"S Lon 39°12'37.10"E	Lat 6°51'33.64"S Lon 39°12'46.57"E
Zone 3	Lat 6°52'35.56"S Lon 39°10'2.21"E	Lat 6°52'46.30"S Lon 39° 9'38.99"E -

ORGANISER



HOST



LEAD SPONSOR



Drone Operators:

- Team Leader (field operation): Name: Deogratias Minja
- Control Tower Coordinator: Name: Devotha Laurent
- Date of ops: 3/11/2017 and 5/11/2017 Altitude: 976.37 feet AGL
HRS: 6-7 hrs subject to weather conditions

ORGANISER



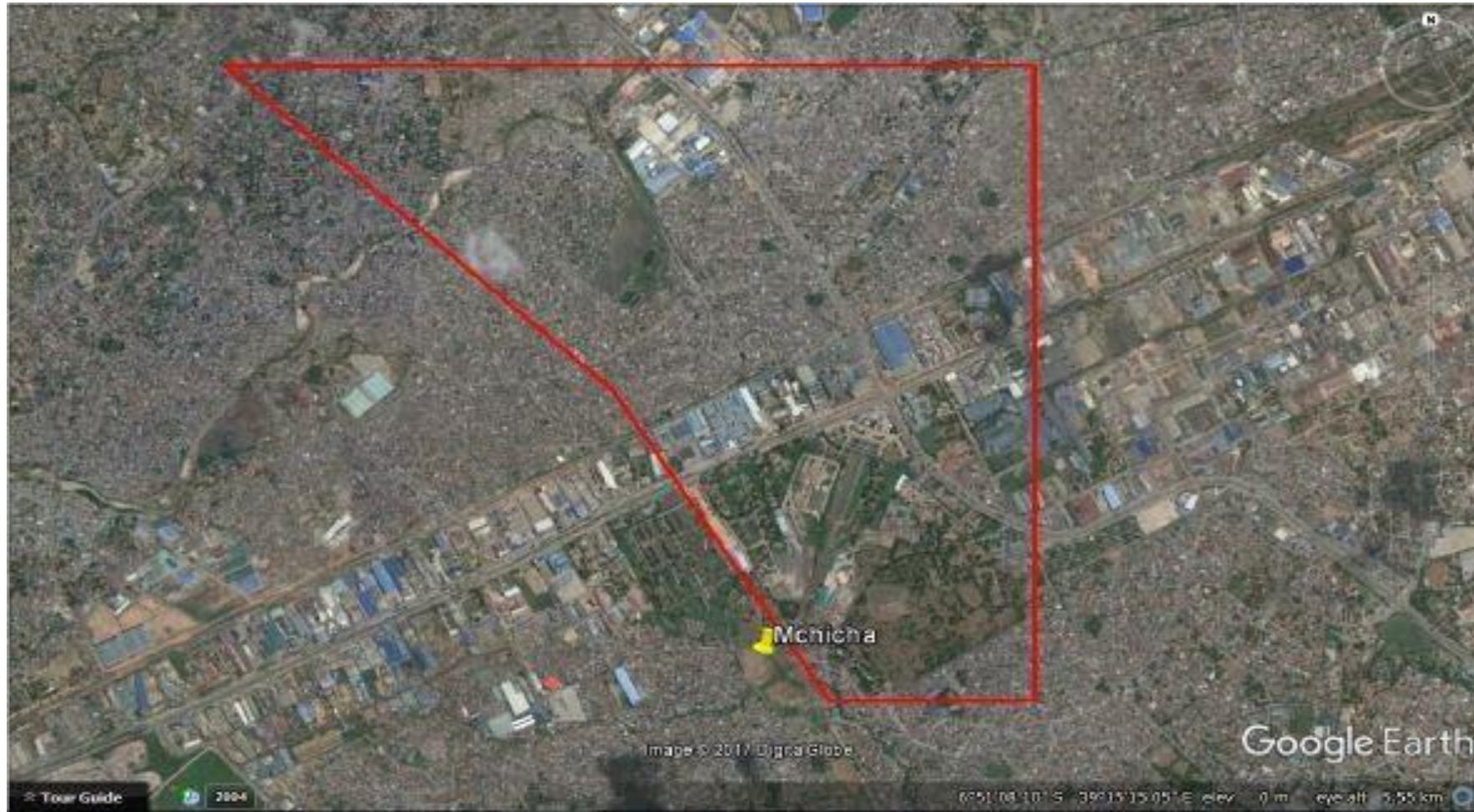
HOST



LEAD SPONSOR



Mapping Zone 1



ORGANISER



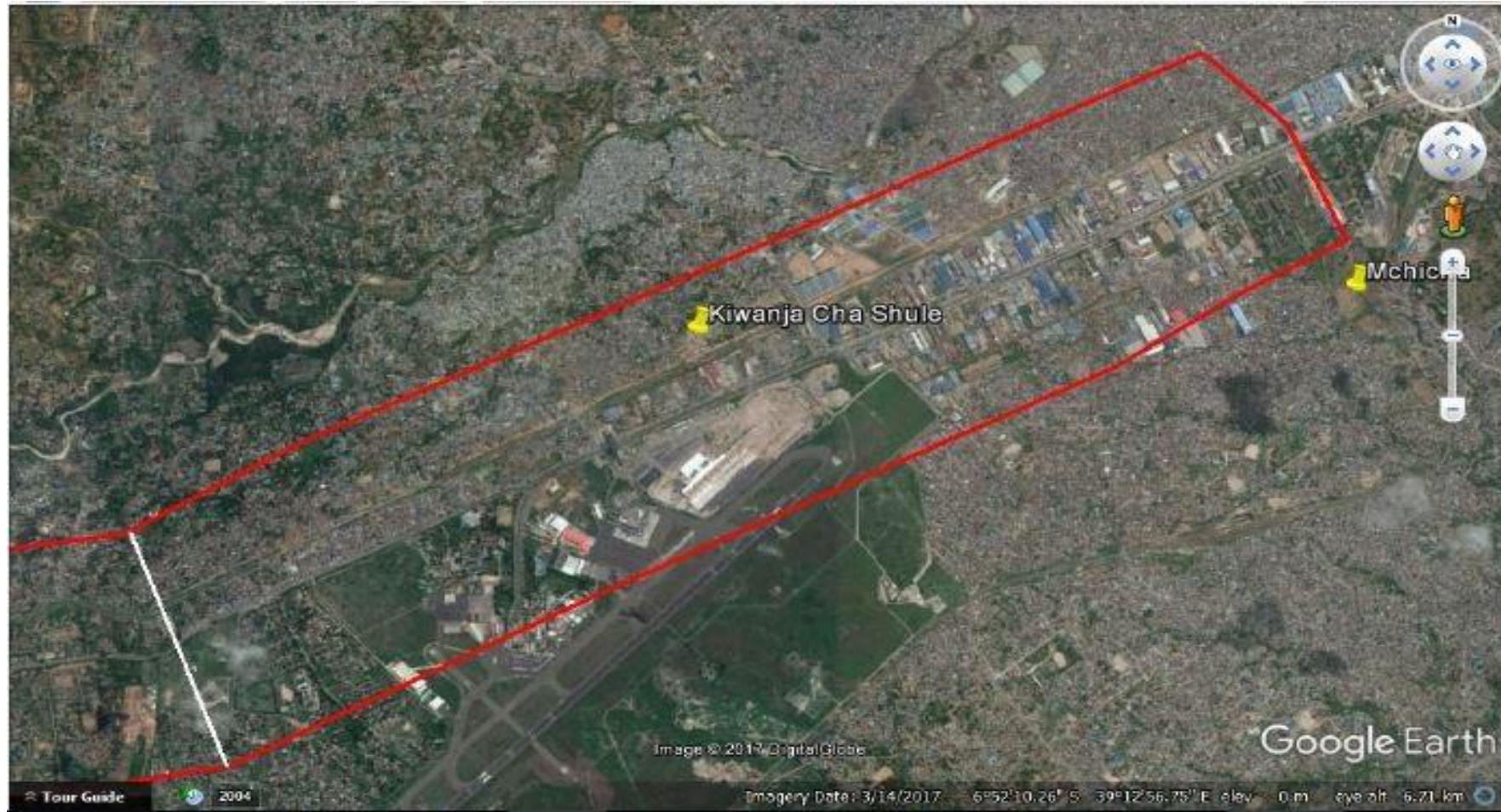
HOST



LEAD SPONSOR



Mapping Zone 2



ORGANISER



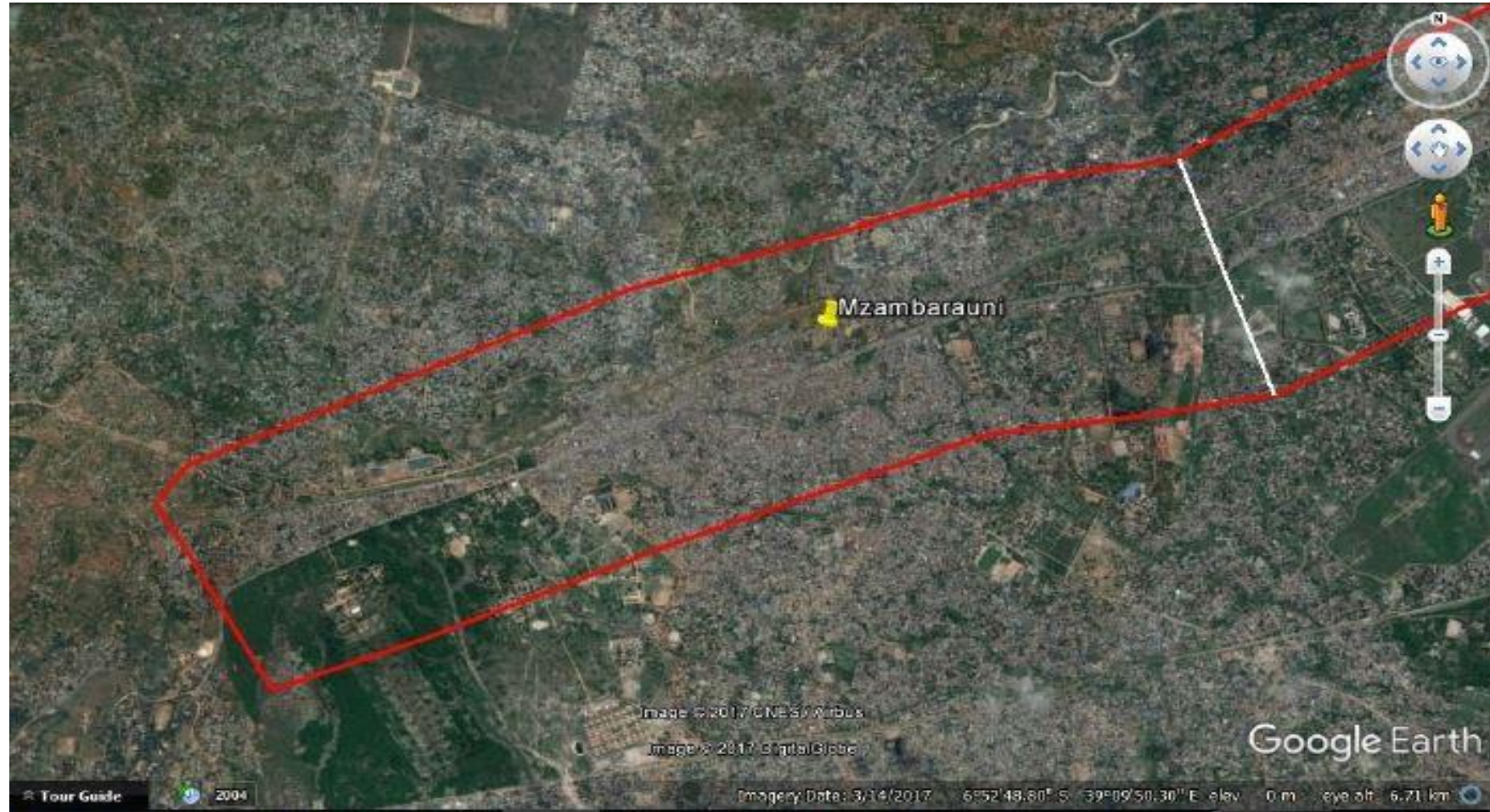
HOST



LEAD SPONSOR



Mapping Zone 3



ORGANISER



HOST



LEAD SPONSOR



Future TCAA plans

1. Learning and applying the best practices from other Authorities, Administrations and Agencies.
2. Deployment of promulgated regulation.
3. Simplified version of AIC 5/18 (Pictorial).
4. More public awareness (interactive posters, car stickers).
5. Centralization of Government organs involved in application process.
6. Sensitization programs.
7. Automation of applications.
8. Introduction of application process fee.
9. GSM based transponders for tracking.

ORGANISER



HOST



LEAD SPONSOR



Nuts story



ORGANISER



HOST



LEAD SPONSOR



Nuts story....

		Safety Security Efficient Comfortable
T	Time	15mins to departure time
D	Diagnose	Allergic passenger - Possible passenger incapacitation during flight
O	Options	Offload the passenger Stop nuts service Reposition passengers to isolate nuts users and allergic passenger – Centre of gravity calculations
D	Decision	Reposition passengers to isolate nuts users from allergic passenger and continue with full service
A	Assign	Capt – PA for repositioning (due to C of G) FO – Redo load sheet and weight and balance Purser – Oversee passenger reposition
R	Review	Cabin crew periodic monitoring and feedback on condition of allergic passenger during flight

ORGANISER



HOST




LEAD SPONSOR



Conclusion

Motive of nuts story;

1. We are always learning
2. Its all about teamwork
3. Start now with what we have – broad, dynamic experience

Team	Work	Goal
	Gather, share, organize information	To ensure safe, secure and efficient operations between UAS and MAS
	Implement	
	Monitor and review	

ORGANISER



HOST



LEAD SPONSOR



Math's

Nuts story collective experience = Capt + FO + Purser

Workshop collective experience = Average experience x Attendees

Global experience = Easy

ORGANISER



HOST



LEAD SPONSOR





canso

Africa Conference 2018

3-5 September, Mombasa, Kenya



ORGANISER



HOST



LEAD SPONSOR

