



# CFIT Prevention in Africa to Improve Safety Performance towards Abuja Safety Targets.

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# Workshop Presenter



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# PRESENTATION OVERVIEW

1. **Why CFIT Workshop in RASG-AFI?**
2. **CFIT Description (SKYbary Safety)**
3. **Lines of Defense and Strategies to prevent CFIT**
4. **Cases of CFIT accidents and Serious Incidents**
5. **CFIT Accident Precursors and defenses**
6. **Conclusions**

# Why CFIT Workshop in RASG- AFI?



Worldwide and in Africa, Runway relating accidents are the most frequent occurrences. According to the last couple of year data, runway safety trends are still increasing.

With the implementation of technological solutions such as GPWS, EGPWS, and TAWS, CFIT accident frequencies are on the decrease.

However, CFIT's collision with the ground results in Hull Loss and fatalities/injuries.

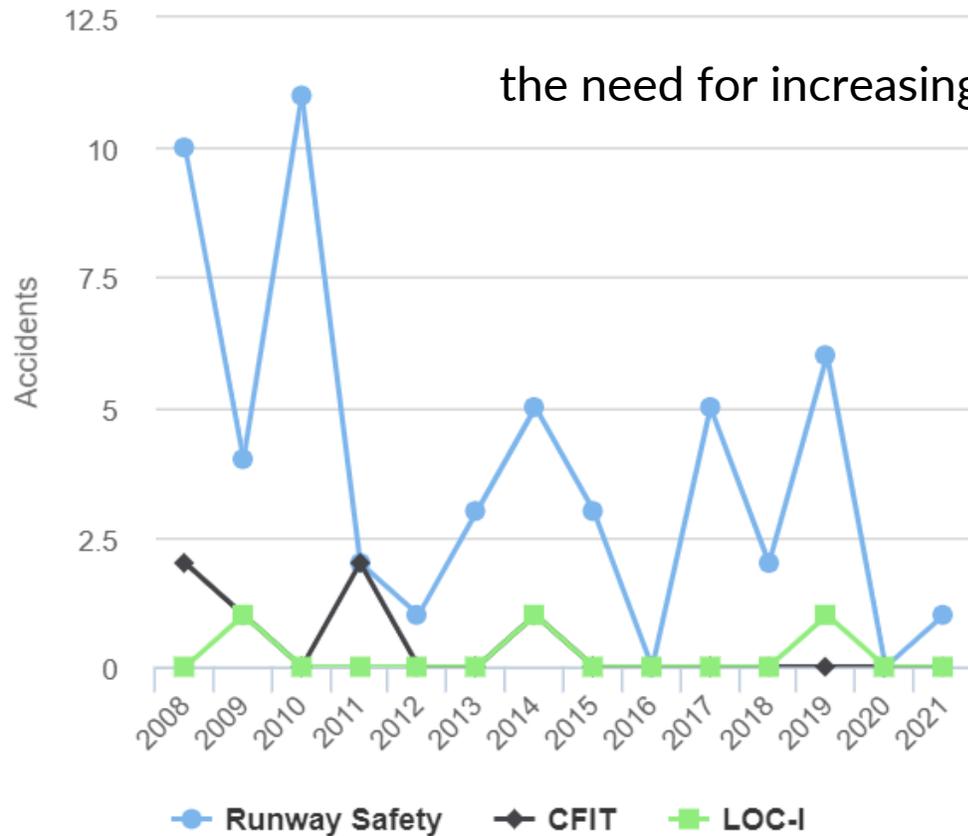
The CFIT type of accident is **the second highest leading cause of fatal accidents.**

# Why CFIT Workshop in RASG- AFI?

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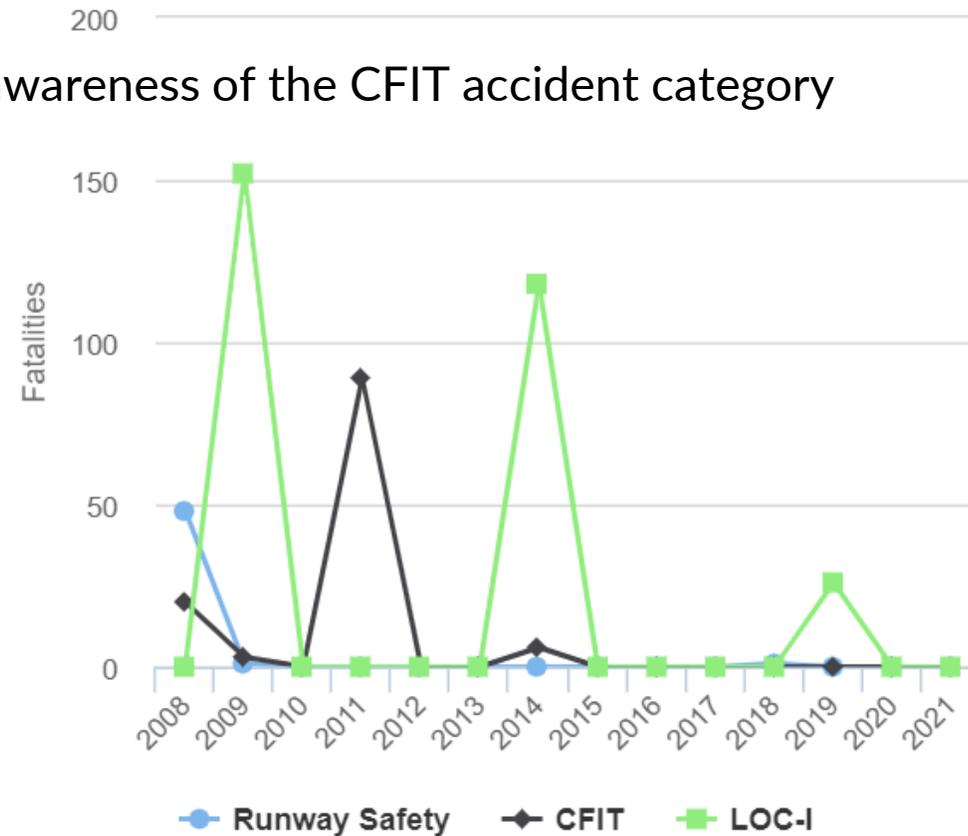
### Accidents by Risk Category

Scheduled Commercial flights on airplanes above 5.7t only



### Fatalities by Risk Category

Scheduled Commercial flights on airplanes above 5.7t only



the need for increasing awareness of the CFIT accident category

# CFIT

## Description

SKYbary  
Safety

Controlled Flight into Terrain (CFIT) occurs when an airworthy aircraft under the complete control of the pilot is inadvertently flown into terrain, water, or an obstacle. The pilots are generally unaware of the danger until it is too late.

Most CFIT accidents occur in the approach and landing phase of flight and are often **associated with non-precision approaches**.

Many CFIT accidents occur because of **loss of situational awareness**, particularly in the vertical plane, and many crash sites are on the centerline of an approach to an airfield. Lack of familiarity with the approach, or misreading of the approach plate, are common causal factors, particularly where the approach features steps down in altitude from the initial approach fix to the final approach fix.



# The FAA Data



According to the FAA's CFIT, Education, and Training Aid, about 25 percent of all accidents occur during the flight's takeoff and initial climb segment.

Approximately 7 percent of the accidents occur during the climb portion, while only about 4.5 percent happen during the cruise.

**Approximately 19.5 percent occur during descent and initial approach, and 41.4 occur during final approach and landing.**

In other words, although takeoff, initial climb, final approach, and landing represent only about 6 percent of a given flight's **total flight time, 6 percent can be deadly.**

# LINES OF DEFENSE

Standard Operating Procedures SOPs

Terrain Avoidance Warning Systems

Situation awareness in relation to terrain

# Lines of defense and Strategies to prevent CFIT



## Standard Operating Procedures (SOPs).

- Utilize available sources of training and simulators and continue flying to maintain proficiency with equipment and in decision-making.
- Execute when SOPs require the aircraft to go-around in the event of an unsterilized approach
- Obtain a complete and accurate weather briefing.
- Use FSF CFIT Checklist and assess CFIT risks and take relevant mitigation measures

# Lines of defense and Strategies to prevent CFIT



## Terrain Avoidance Warning Systems (TAWS).

- Know your equipment and honestly assess proper use.
  - A ground proximity warning system (**GPWS**) is a system designed to alert pilots if their aircraft is in immediate danger of flying into the ground or an obstacle.
  - The **EGPWS** combines the GPWS information with an Internal GPS worldwide terrain database that monitors the terrain proximity.
  - Basically, the Enhanced Ground Proximity Warning System is a more accurate and improved GPWS.
  - With the **EGPWS**, the Pilots can receive Terrain caution or warning alerts, called Look-Ahead Terrain alerts, based on the estimated time to the impact.
  - This gives more time to the Pilots to react to these Look-Ahead Terrain alerts.
- Recognize when to turn around and do so before you feel uneasy.

# Lines of defense and Strategies to prevent CFIT



- **Situational awareness in relation to terrain**

- Pilot-induced situation

- An example:

- The pilot encountered weather conditions that were worse than forecast and, in an attempt to maintain or regain visual contact with the ground in an area of very low cloud, descended below Minimum Safe Altitude (MSA) and the aircraft struck the ground. Contributing to this accident was the pilot's over-reliance on GPS while attempting to maintain Visual Meteorological Conditions (VMC) and a resultant lack of adequate situational awareness of terrain.

- ATCO induced situation

- An example:

- The controller gave an aircraft which was still at 210 KIAS an intermediate heading towards the ILS centreline during a radar vectored initial approach but was subsequently distracted and failed to issue the intercept heading for the ILS LLZ. When the flight crew, who were unfamiliar with the approach, failed to notice the situation in time to query it, the aircraft flew beyond the centreline and into high terrain on the other side before resolution was possible.

# Lines of defense and Strategies to prevent CFIT



- **Situational awareness in relation to terrain**

- Contributing Factors
  - Weather
  - Approach design and documentation
  - Un-stabilized approaches are frequent factors in approach and landing accidents, including those involving CFITs
  - Failure to use standard phraseology may lead to confusion.
  - Fatigue

# Lines of defense and Strategies to prevent CFIT



- **Situational awareness in relation to terrain**

- **Un-stabilized approaches**

- Most airlines and other aviation organizations specify minimum acceptable criteria for the continuation of an approach to land. These vary in detail, but the following summary published by the [Flight Safety Foundation](#) is one view of the important considerations.
- Their Approach-and-landing Accident Reduction ([ALAR](#)) [Briefing Note 7-1](#) suggests that "all flights must be stabilized by 1000 feet above airport elevation in [IMC](#) and 500 feet above airport elevation in [VMC](#). An approach is stabilized when all of the following criteria are met:
  - The aircraft is on the correct flight path Only small changes in heading/pitch are necessary to maintain the correct flight path
  - The airspeed is not more than  $V_{REF} + 20\text{kts}$  indicated speed and not less than  $V_{REF}$
  - The aircraft is in the correct landing configuration
  - Sink rate is no greater than 1000 feet/minute; if an approach requires a sink rate greater than 1000feet/minute a special briefing should be conducted

# Lines of defense and Strategies to prevent CFIT



- **Situational awareness in relation to terrain**
- Specific types of approach are stabilized if they also fulfil the following:
  - ILS approaches must be flown within one dot of the glide-slope and localizer
  - A Category II or III approach must be flown within the expanded localizer band
  - During a **circling approach** wings should be level on final when the aircraft reaches 300 feet above airport elevation; and,
- Unique approach conditions or abnormal conditions requiring a deviation from the above elements of a stabilized approach require a special briefing.
- An approach that becomes unsterilized below 1000 feet above airport elevation in **IMC** or 500 feet above airport elevation in VMC requires an immediate **go-around**

# Cases of CFIT accidents and Serious Incidents En-route

## [A320, en-route Alpes-de-Haute-Provence France, 2015](#)

On 24 March 2015, after waiting for the Captain to leave the flight deck and preventing his return, a Germanwings A320 First Officer put his aircraft into a continuous descent from FL380 into terrain killing all 150 occupants. Investigation concluded the motive was suicide, noted a history of mental illness dating from before qualification as a pilot and found that prior to the crash he had been experiencing mental disorder with psychotic symptoms which had not been detected through the applicable process for medical certification of pilots. Conflict between the principles of medical confidentiality and wider public interest was identified.

## [DHC6, en-route, Mount Elizabeth Antarctica, 2013](#)

On 23 January 2013, a Canadian-operated DHC6 on day VFR positioning flight in Antarctica was found to have impacted terrain under power and whilst climbing at around the maximum rate possible. The evidence assembled by the Investigation indicated that this probably occurred following entry into IMC at an altitude below that of terrain in the vicinity having earlier set course en route direct to the intended destination. The aircraft was destroyed and there were no survivors.

# SECURITY OF A FLIGHT



Cases of CFIT  
accidents and  
Serious  
Incidents

Approach and  
Landing

## **Approach and Landing**

### [GLF5, vicinity Paris Le Bourget France, 2017](#)

On 10 September 2017, the First Officer of a Gulfstream G550 making an offset non-precision approach to Paris Le Bourget failed to make a correct visual transition and after both crew were initially slow to recognise the error, an unsuccessful attempt at a low-level corrective realignment followed. This had not been completed when the auto throttle set the thrust to idle at 50 feet whilst a turn was being made over the runway ahead of the displaced threshold and one wing was in collision with runway edge lighting. The landing attempt was rejected and the Captain took over the go-around.

### [B772, en-route, near Mount Cameroon Cameroon, 2015](#)

On 2 May 2015, a Boeing 777-200 deviating very significantly north of its normal route from Malabo to Douala at night because of convective weather had just turned towards Douala very close to 13,202 feet high Mount Cameroon whilst descending through 5000 feet, when an EGPWS TERRAIN AHEAD alert and 'PULL UP' warning prompted an 8,000 foot climb which passed within 2,100 feet of terrain when close to and still below the summit. The Investigation attributed the dangerous event primarily to a gross absence of the augmented crew's situational awareness and the operator's failure to risk-assess the route involved.

# Cases of CFIT accidents and Serious Incidents

## Approach and Landing

### [B738, vicinity Bergerac France, 2015](#)

On 29 January 2015, a Boeing 737-800 crew attempting to fly an NDB approach to Bergerac, with prior awareness that it would be necessary because of pre-notified ILS and DME unavailability, descended below 800 feet agl in IMC until an almost 1000 feet per minute descent when still over 8 nm from the runway threshold triggered an EGPWS 'TERRAIN PULL UP' warning and the simultaneous initiation of a go-around. The Investigation found that the PF First Officer was unfamiliar with NDB approaches but had not advised the Captain which resulted in confusion and loss of situational awareness by both pilots.

### [B742, Sokoto Nigeria, 2013](#)

On 4 October 2013, a Boeing 747-200 touched down short of the intended landing runway at Sokoto after the Captain opted to reduce track miles by making a direct visual contact approach in dark night calm wind conditions rather than continuing as initially cleared towards an ILS approach in the reciprocal runway direction. The Investigation was hampered by an inoperative FDR and failure to preserve relevant CVR data on the grounded aircraft and concluded that the decision to make a visual approach rather than an ILS approach when the VASI was out of service for both runways was inappropriate

# CFIT Accident Precursors and defenses

Make use of safety data from any available safety reporting or monitoring scheme, such as:

- Feedback from training (especially simulator) sessions;
- Pilots' reports;
- Flight data analysis -FDA;
- Line observations (e.g. Line Operations Safety Audit (LOSA));
- Survey and audit reports; as well as,
- Accident and incident investigation.



# Flight Data Analysis

In the 2000s, Flight Data Analysis during in the framework of an IATA Safety Project in Africa:

- Identified unstable approaches at Addis while approaches were stable at Nairobi.
- The mixt of aircraft types, operators, and crew were similar.
- Thorough assess led to the implementation of PBN procedure, STARS, and Continuous Descend Operations implementation at Addis Ababa to stabilize the approaches there.



## CONCLUSION

- More widespread equipment of aircraft with TAWS.
- Electronic Terrain and Obstacle Data (eTOD)
- Greater awareness of Approach and Landing risks.
- Situation awareness
- Obtain a complete and accurate weather briefing
- Continuous Descent Final Approaches (CDFA).
- Strict compliance with the stabilized approach principle by pilots.
- ATC awareness of factors within their control which can contribute to an unsterilized approach.
- Strict compliance with SOPs

# THANK YOU



*Better Skies for Africa*

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