AFI FRA PMT5 and UPR WS , OCTOBER 2024, NAIROBI

21 to 25 October 2024, NAIROBI, KENYA

FRA IMPLEMENTATION FRAMEWORK

Presented by AFI FRA PMT

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FRA Implementation Framework

Content:

- ✓ **FRA, AS PART OF GLOBAL AIR NAVIGATION PLAN**
- ✓ **FRTO : FRTO-B0/1 Direct routing (DCT)**
- ✓ **FRTO-B1/1 Free Route Airspace (FRA)**
- ✓ **FRA APIRG CONCLUSIONs**
- ✓ **FRA CONOPS**

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GLOBAL AIR NAVIGATION PLAN (GANP)

- It is the most important strategic document of ICAO regarding air navigation.
- It guides the evolution of the global air navigation system.
- It ensures compliance with the Global Air Traffic Management Operational Concept (GATMOC, Doc 9854)
- and the Manual on Air Traffic Management System Requirements (Doc 9882).

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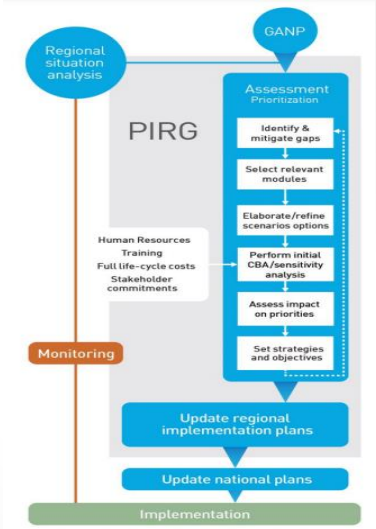
PIRG: Planning and Implementation regional Group

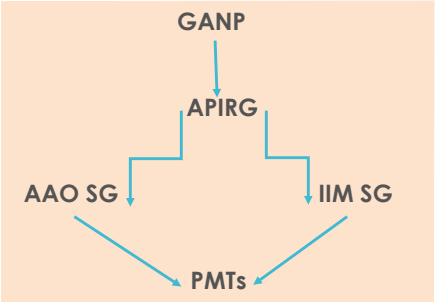
- Regardless of the global perspective of the GANP, it is not required that all ASBU modules be implemented in every State and region.

- Many of the modules included in the GANP are specialized sets that should only be implemented in locations where they address a specific operational need and where the corresponding benefits can be reasonably expected.



APIRG and Project Teams

- **Guided by the GANP**, regional and national **planning processes** should be harmonized and used to identify the **modules best suited** to meet the identified **operational needs**.



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FRA, AS PART OF GLOBAL AIR NAVIGATION PLAN

Free Routing Airspace

Free Route Airspace (FRA) is a module of ASBU: module B1-FRTO and therefore **forms part of AFI ASBU plan**.

FRA is concept that allows States/ANSPs to overcome the challenges in ATM **safety**, **efficiency**, **capacity** and **environmental** issues facing aviation.

	GANP - ASBU - FRTO
FRTO-B0/1	Direct routing (DCT)
FRTO-B0/2	Airspace planning and Flexible Use of Airspace (FUA)
FRTO-B0/3	Pre-validated and coordinated ATS routes to support flight and flow
FRTO-B0/4	Basic conflict detection and conformance monitoring
FRTO-B1/1	Free Route Airspace (FRA)
FRTO-B1/2	Required Navigation Performance (RNP) routes

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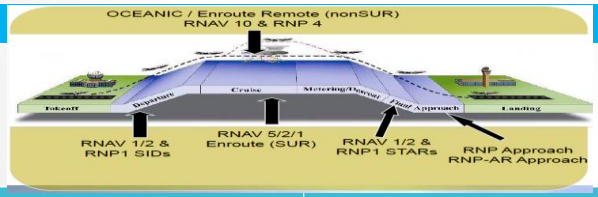
ASBU PBN MODULES UNDER APTA AND FRT0



PBN UNDER APTA ELEMENTS		PBN UNDER FRTO ELEMENTS	
APTA-B0/1	PBN Approaches (with basic capabilities)	FRTO-B0/1	Direct routing (DCT)
APTA-B0/2	PBN SID and STAR procedures (with basic capabilities)	FRTO-B1/1	Free Route Airspace (FRA)
APTA-B0/3	SBAS/GBAS CAT I precision approach procedures	FRTO-B1/2	Required Navigation Performance (RNP) routes
APTA-B0/4	CDO (Basic)		
APTA-B0/5	CCO (Basic)		
……	…….		

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FRA AS A PRIORITY IN AFI REGION

Conclusion 22/36 called upon States to incorporate the FRA concept into airspace and air traffic management. Six states were selected as case studies.

Conclusion 23/02 of APIRG urges that priority be given to FRA implementation

Conclusion 25/03 encourages States that have implemented FRA to share lessons learnt from their experience.

APIRG/26 Decision 26/04 stated that the FRA, PBN and CMC Civil-Military Cooperation PMTs to coordinate the conduct of at least two joint workshops/ meetings to optimize resources and improve coordination of activities

and finally **APIRG/26 Conclusion 26/09** implemented User Preferred Routes (UPR) Trials to Support FRA Implementation in the Continental AFI airspace using CADENA and CADENCE OIS (Operational Information System), as the information-sharing platform

FRTO : FRTO-B0/1 DIRECT ROUTING (DCT)

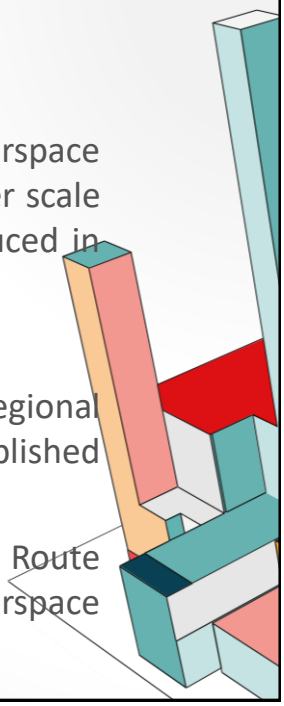
- **Main Purpose**

✓Direct routings are established with the aim of providing airspace users with additional flight planning route options on a larger scale across FIRs such that overall planned leg distances are reduced in comparison with the fixed route network.

- **New Capabilities**

✓ Direct routings (DCTs) are established at national and regional levels and made available for flight planning (with published conditions of use).

✓DCTs should be considered as an early iteration of the Free Route Airspace (FRA) concept. Direct routing operations allow airspace users to optimize flight and fuel planning.



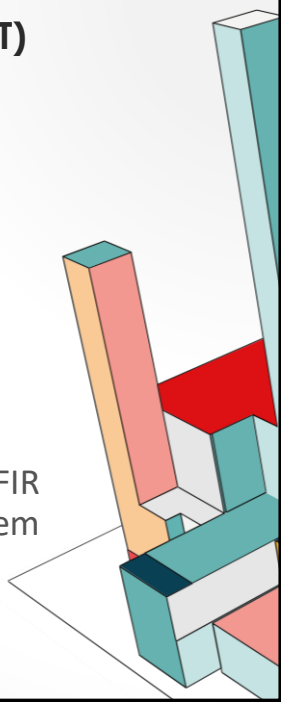
FRTO : FRTO-B0/1 DIRECT ROUTING (DCT)

- **Description**

DCTs could be implemented in a limited way e.g.:

✓**time constraint (fixed or depending on traffic/ availability);**
✓**traffic constraint (based on flow and/or level of traffic);**
✓**flight level;**
✓**lateral constraints;**
✓**entry/exit conditions.**

The extension of direct routings within and across the FIR boundaries also requires Network and ANSPs ground system upgrades for airspace management and flight data processing.



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FRTO : FRTO-B0/1 DIRECT ROUTING (DCT)

- **Procedures**

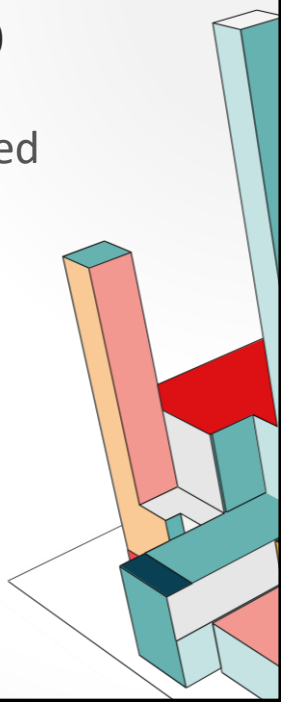
The following procedures and process might need to be considered:

✓ identify the direct routing airspace volume (lateral and vertical) and applicable time;

✓direct routings may co-exists with ATS route structure;

✓identify direct routing entry and exit points;

✓adapt airspace design and ensure direct routing horizontal and vertical connectivity;



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FRTO : FRTO-B0/1 DIRECT ROUTING (DCT)

- **Procedures (Continued)**

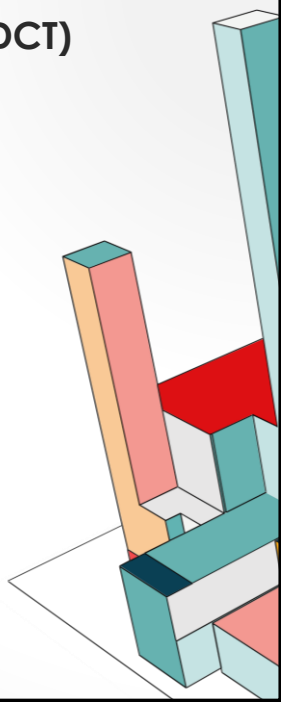
✓ATFM direct routing procedures;

✓adapt the LoA with adjacent ATS units;

✓publish relevant data for direct routing in AIP;

✓airspace management procedure for the implementation of direct routings;

✓ATC procedures to cover direct routing co-ordination and transfer of control, trajectory change in direct routing; environment, conflict detection.



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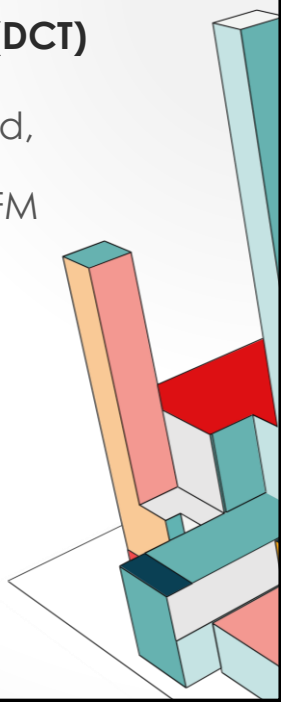
FRTO : FRTO-B0/1 DIRECT ROUTING (DCT)

- **Equipment**

The ATM system upgrades of FDP and CWP, if required, are related to:

- ✓upgrade of network flight planning and ASM/ATFM system for DCTs;
- ✓direct routing clearances;
- ✓rerouting capabilities in cases the direct routing traversed the military airspace; differentiation
- ✓between different traffic type airspaces;
- ✓direct route beyond AoR;
- ✓calculation of 4D trajectory with AoI;
- ✓editing function for 4D trajectories.



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FRTO : FRTO-B0/1 DIRECT ROUTING (DCT)

HUMAN FACTOR CONSIDERATION

N°	Question	Answer
1	Does DRO imply a change in task by a user or affected others?	Yes
2	Does it imply processing of new information by the user?	Yes
3	Does it imply the use of new equipment?	Yes
4	Does it imply a change to levels of automation?	Yes

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FRTO : FRTO-B0/1 DIRECT ROUTING (DCT)

DEPENDENCIES AND RELATIONS

Type of Dependencies	ASBU Element
Relation-operational need	NOPS-B0/1 - Initial integration of collaborative airspace management with air traffic flow management
Relation-operational need	FRTO-B0/2 - Airspace planning and Flexible Use of Airspace (FUA)
Relation-operational need	FRTO-B0/4 - Basic conflict detection and conformance monitoring
Relation-operational need	FICE-B0/1 - Automated basic inter facility data exchange (AIDC)

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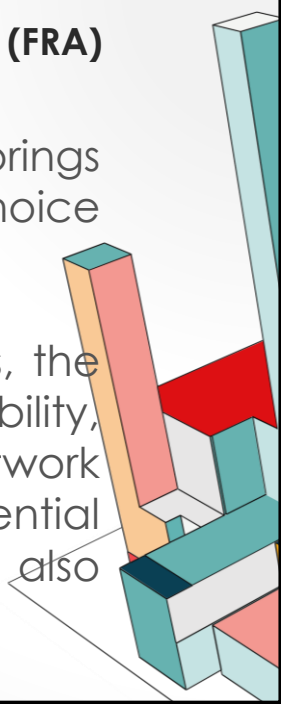
FRTO-B1/1 FREE ROUTE AIRSPACE (FRA)

- **Main Purpose**
- The Free Route Airspace (FRA) concept brings significant flight efficiency benefits and a choice of user preferred routes to airspace users.
- As a step to full trajectory-based operations, the FRA concept brings increased flight predictability, reduced uncertainty for the ATM network function, which in turn can lead to potential capacity increases for ATM, which will also benefit the user.



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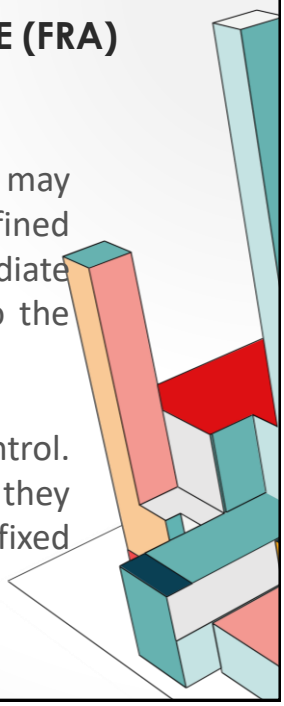
FRTO-B1/1 FREE ROUTE AIRSPACE (FRA)

- **New capabilities**

✓FRA is a specified volume of airspace within which users may freely plan a route between a defined entry point and a defined exit point, with the possibility to route via intermediate (published or unpublished) waypoints, without reference to the ATS route network, subject to airspace availability.

✓Within this airspace, flights remain subject to air traffic control. FRA enables airspace users to fly as close as possible to what they consider the optimal trajectory without the constraints of a fixed route network structure.



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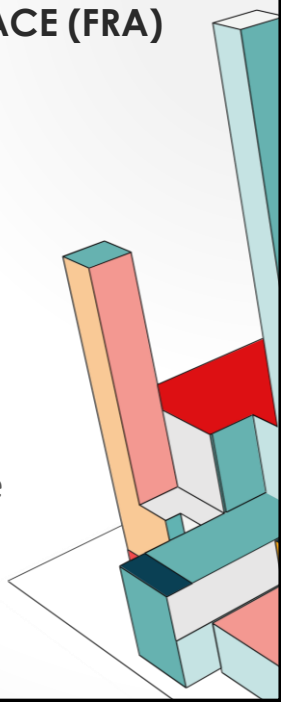
FRTO-B1/1 FREE ROUTE AIRSPACE (FRA)

- **Description**

FRA implementation can be customized for instance:

- ✓laterally and vertically;
- ✓during specific periods;
- ✓with a set of entry/exit conditions;
- ✓with initial system upgrades.

The extension of FRA within and across the FIR boundaries also requires upgrades of the ATM network function system and the ANSPs ground system for airspace management and flight data processing..



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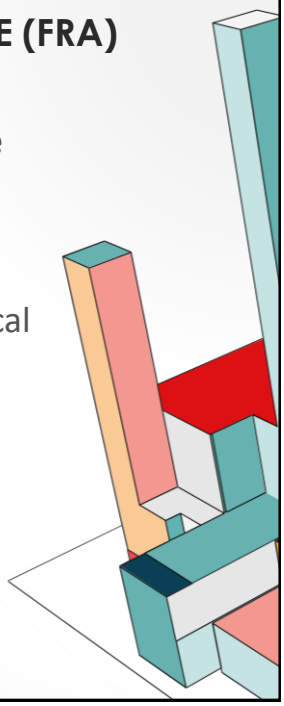
FRTO-B1/1 FREE ROUTE AIRSPACE (FRA)

- **Procedures**

FRA airspace volume (lateral and vertical) and applicable time (not necessary H24 7/7);

- ✓FRA entry and exit points, arrival transition point and departure transition point, and intermediate points;
- ✓adapt airspace design and ensure FRA horizontal and vertical connectivity;
- ✓ATFM FRA procedures;
- ✓adapt the LoA with adjacent -and military- ATS units;



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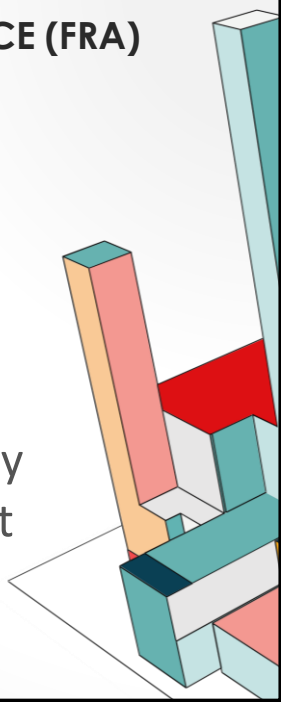
FRTO-B1/1 FREE ROUTE AIRSPACE (FRA)

- **Procedures (Continued)**
  - ✓publish relevant data for FRA in AIP;
  - ✓charts for FRA operations;
  - ✓airspace management procedure for the implementation of free routes operation;
  - ✓ATC procedures to cover free route co-ordination and transfer of control, trajectory change in a free route environment, conflict detection.



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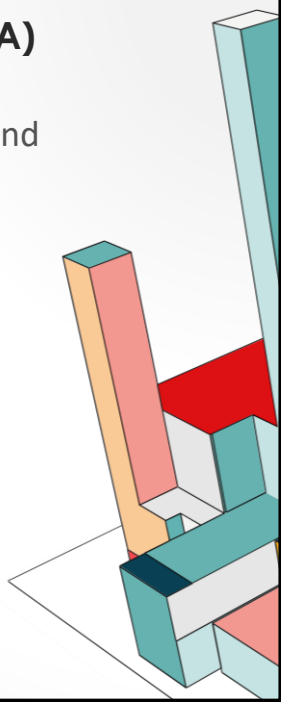
FRTO-B1/1 FREE ROUTE AIRSPACE (FRA)

- **Equipment**

Upgrades of ATM systems for flight data processing and controller working postition, if required, are related to:

- ✓ ATC clearances beyond AoR;
- ✓ differentiation between different traffic type airspaces;
- ✓ calculation of 4D trajectory with AoI;
- ✓ editing function for 4D trajectories;
- ✓ coordination point management for FRA;
- ✓ coordination with military agencies;
- ✓ enhance conflict management and controller HMI functions to support conflict detection and resolution.



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FRTO-B1/1 FREE ROUTE AIRSPACE (FRA)

HUMAN FACTOR CONSIDERATION

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FRTO-B1/1 FREE ROUTE AIRSPACE (FRA)

DEPENDENCIES AND RELATIONS

Type of Dependencies	ASBU Element
Relation-operational need	NOPS-B1/5 - Full integration of airspace management with air traffic flow management
Relation-operational need	FRTO-B1/4 - Dynamic sectorization
Relation-operational need	FRTO-B1/3 - Advanced Flexible Use of Airspace (FUA) and management of real time airspace data
Relation-operational need	FICE-B0/1 - Automated basic inter facility data exchange (AIDC)
Relation-operational need	FRTO-B1/5 - Enhanced Conflict Detection Tools and Conformance Monitoring
Relation-operational need	DAIM-B2/2 - Daily Airspace Management information to support flight and flow
Evolution	FRTO-B0/1 - Direct routing (DCT)

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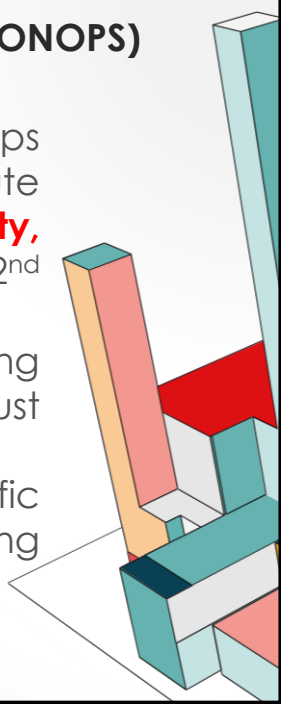
AFI FRA CONCEPT OF OPERATION (CONOPS)

- **The AFI FRA ConOps:**

✓AFI region has a clear and well-developed ConOps whis is key to successfully implementing Free Route Airspace in the AFI region, **enhancing safety, efficiency, and coordination**. (Now we are at 2nd Edition)

✓AFI FRA ConOps helps improve safety by establishing **guidelines and procedures** that all stakeholders must follow

✓It promotes **better coordination** among air traffic controllers, airlines, and airport operators, ensuring smooth operations across the region



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AFI FRA CONCEPT OF OPERATION (CONOPS)

- **The AFI FRA ConOps (continued):**

✓With Free Route Airspace, pilots can choose their own flight paths. A solid ConOps ensures that these choices are managed **safely and efficiently**.

✓By defining roles and responsibilities, the ConOps helps streamline operations, **reducing delays and saving fuel**.

✓The ConOps allows for adjustments based on new technologies and changes in air traffic trajectories, **making the airspace more responsive to needs.**

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FRA and DRO FRAMEWORK SUMMARY

Free Routing Airspace

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FRA is concept that allows States/ANSPs to overcome the challenges in ATM safety, efficiency, capacity and environmental issues facing aviation.

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FRTO-B1/2	Required Navigation Performance (RNP) routes

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FRA and DRO FRAMEWORK SUMMARY

- **Tactical DCT :** request on radio during flight, if granted by ATC, fuel saved but still carried on board and not converted into a marketable load (pax or cargo.) in flight.
- **Plannable DCT :** based on study, granted and published in advance by ANSP, AO can convert the fuel gain into payload.

OPS	TYPE	COMMENT
TACTICAL DCT	LOCAL	FRA PMT encourages to move to plannable directs
	CROSS-BORDER	Not encouraged at this stage, coordination required with adjacent FIR
PLANNABLE DCT	LOCAL	AIC/AIP SUP being issued by States/FIR; repository of plannable DCT being prepared,
	CROSS-BORDER	Not a focus at this stage, coordination required with adjacent FIR and LoPs will need to be revised, has linkage with PBN route implementation or DCT trials
FRA	LOCAL	Current focus of FRA PMT : state level, some planning implementation by December 2023
	CROSS-BORDER	At regional level, more benefits, future steps, enhanced coordination

IN RECOGNITION OF MAURITIUS' EFFORTS AS A CHAMPION FIR IN THE IMPLEMENTATION OF THE FRA IN THE AFI REGION

LEFT TO RIGHT

DRD
RD
AFI FRA PMT CP
MAURITIUS FRA FP

Place : NAIROBI
Date : May 2023

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