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PANS-OPS Flight Procedure Design Training for CAAs

23 August – 03 September 2021





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Introduction





- Navigation basics
- What is an Instrument Flight Procedure?
- Flight procedure typology
- Flight procedure design characteristics
- Regulatory framework
- Procedure design actors
- Flight procedure deliverables



☐ Navigation is performed using a navigation information (guidance):

☞ Visual information: **Visual navigation;**

☞ Radio information provided by a facility: **Instrument navigation:**

■ Conventional navigation:

- Ground nav aids with specific coverage;
- For aircraft suitably equipped;
- Guidance information:

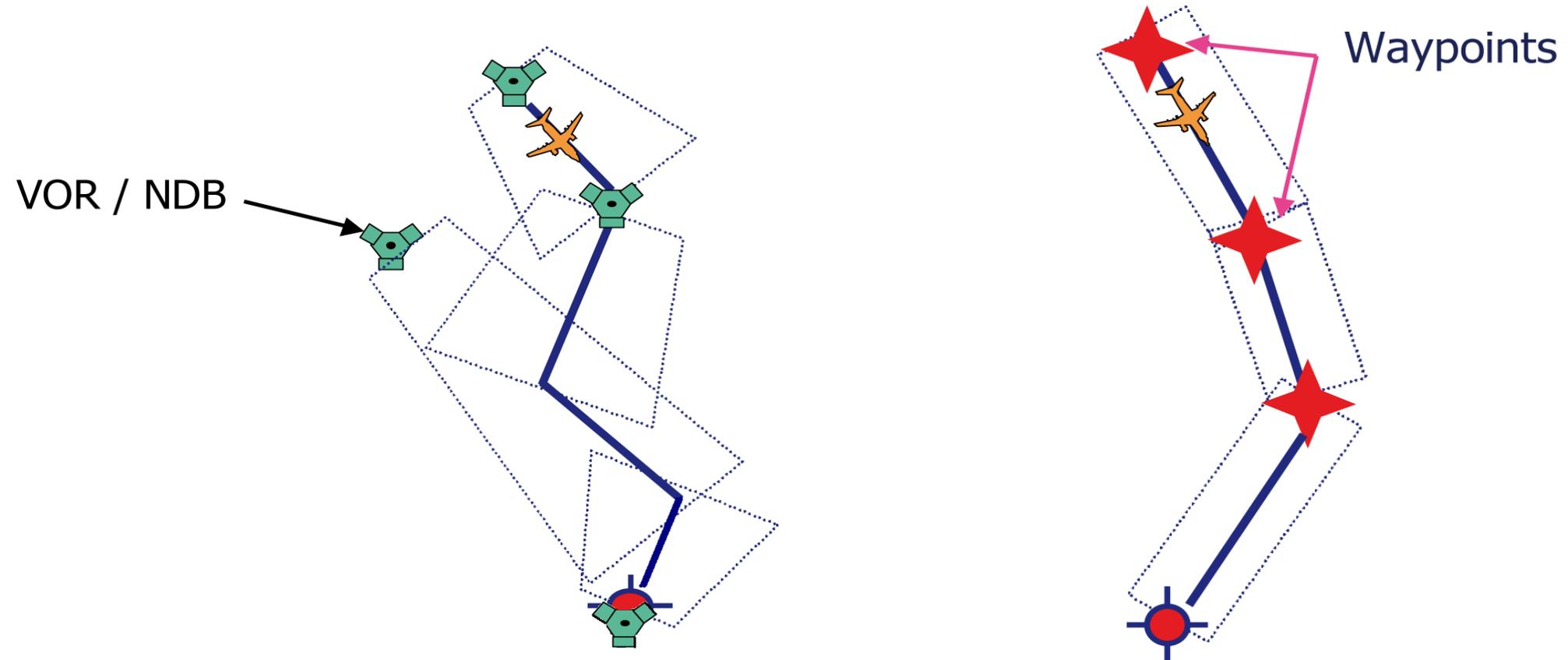
✓ Position from/to facility, distance, slope, etc.

■ Performance-Based Navigation:

- Ground or space-based nav aids, autonomous systems
- For aircraft suitably equipped;
- Guidance information:

✓ Position, distance, time, slope, etc.

Navigation principle



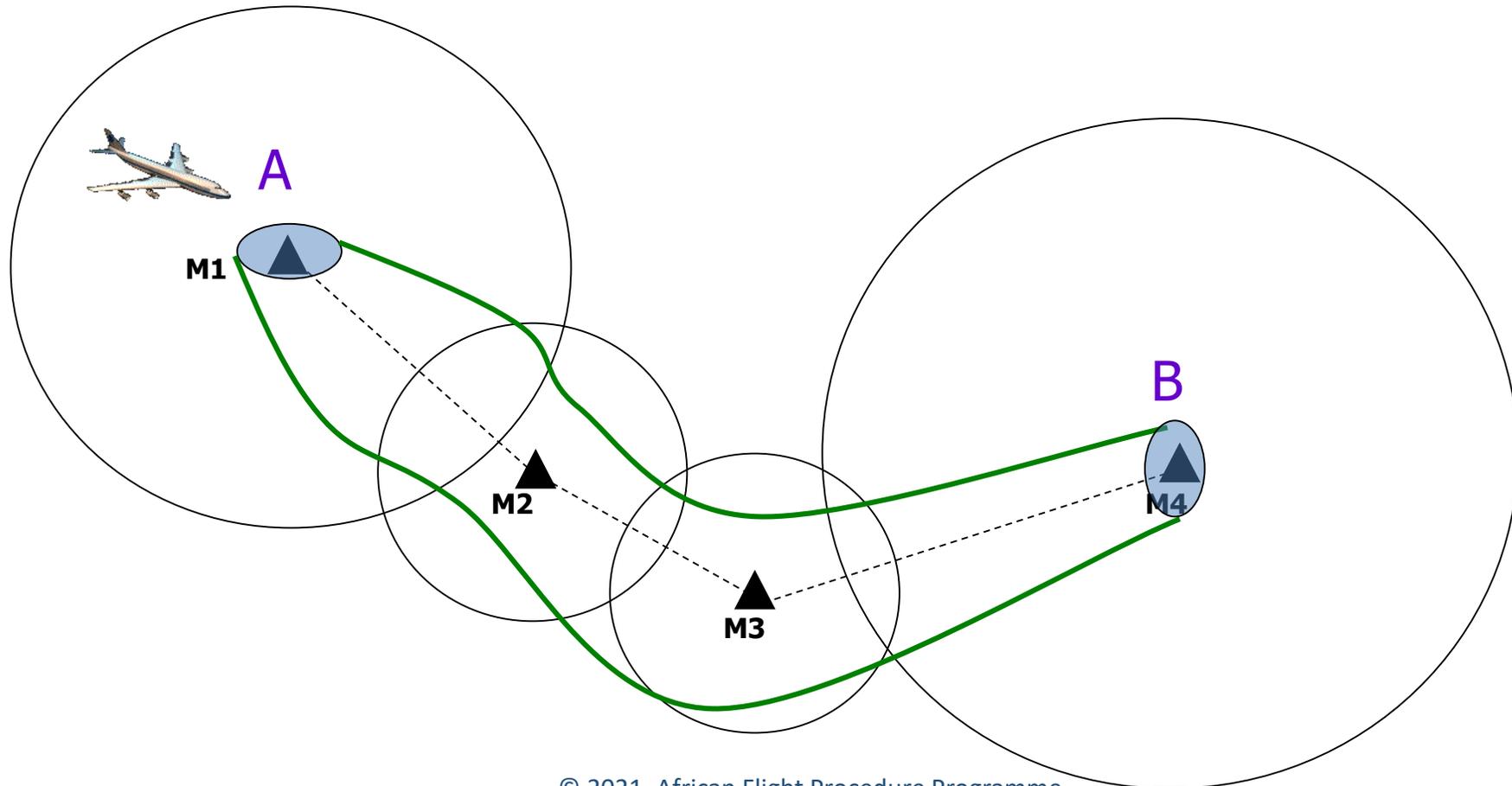


What is an Instrument Flight Procedure?

African Flight Procedure Programme (AFPP)

- ❑ Instrument Flight Procedure (IFP): Set of protected trajectories of an aircraft flying according to IFR rules.
- ❑ Why do we need protection (Protection area) ? Because of...
 - ☞ The obstacles and constraints along the route;
 - ☞ The inaccuracy of the navigation facilities
 - ☞ The inaccuracy of the aircrafts receivers;
 - ☞ The ability of the pilot;
 - ☞ The wind effect;
 - ☞ Etc.

Protection area: 3 D Tube in which a flying aircraft can be located





What is a Flight procedure?

African Flight Procedure Programme (AFPP)

□ Protection of the trajectories mainly based on:

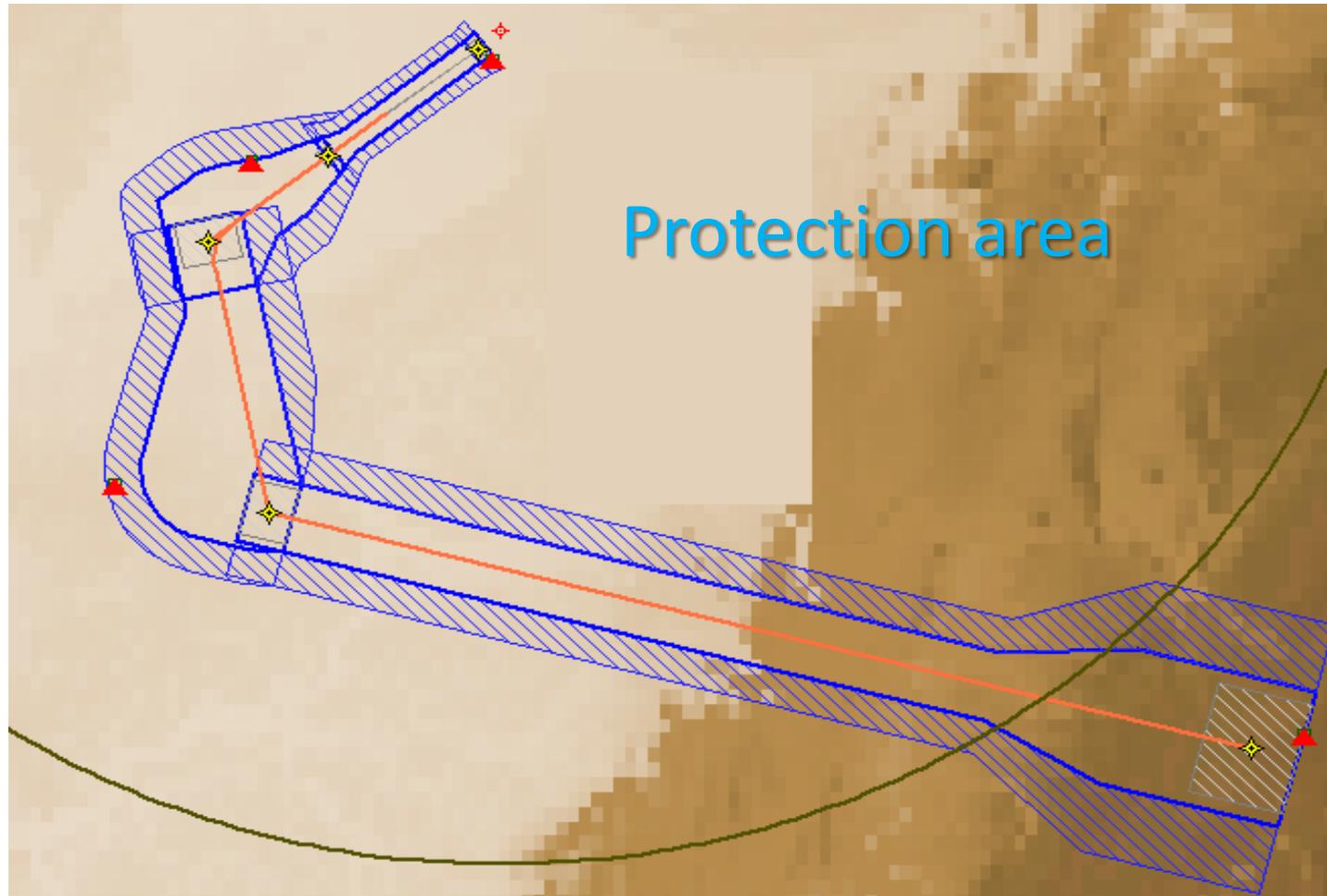
- ☞ Nominal trajectory;
- ☞ Aircraft parameters: 5 categories of aircraft;
- ☞ Facilities accuracy;
- ☞ Fix tolerances;
- ☞ Wind condition.

□ Terminal area fixes:

- ☞ Initial Approach Fix : IAF;
- ☞ Intermediate approach fix : IF;
- ☞ Final Approach Point/Fix : FAF;
- ☞ Holding Fix : HF;
- ☞ Missed Approach Point : MAPt;
- ☞ Turning Altitude/Point : TA/TP.

What is a Flight procedure?

African Flight Procedure Programme (AFPP)





Flight procedure typology

African Flight Procedure Programme (AFPP)

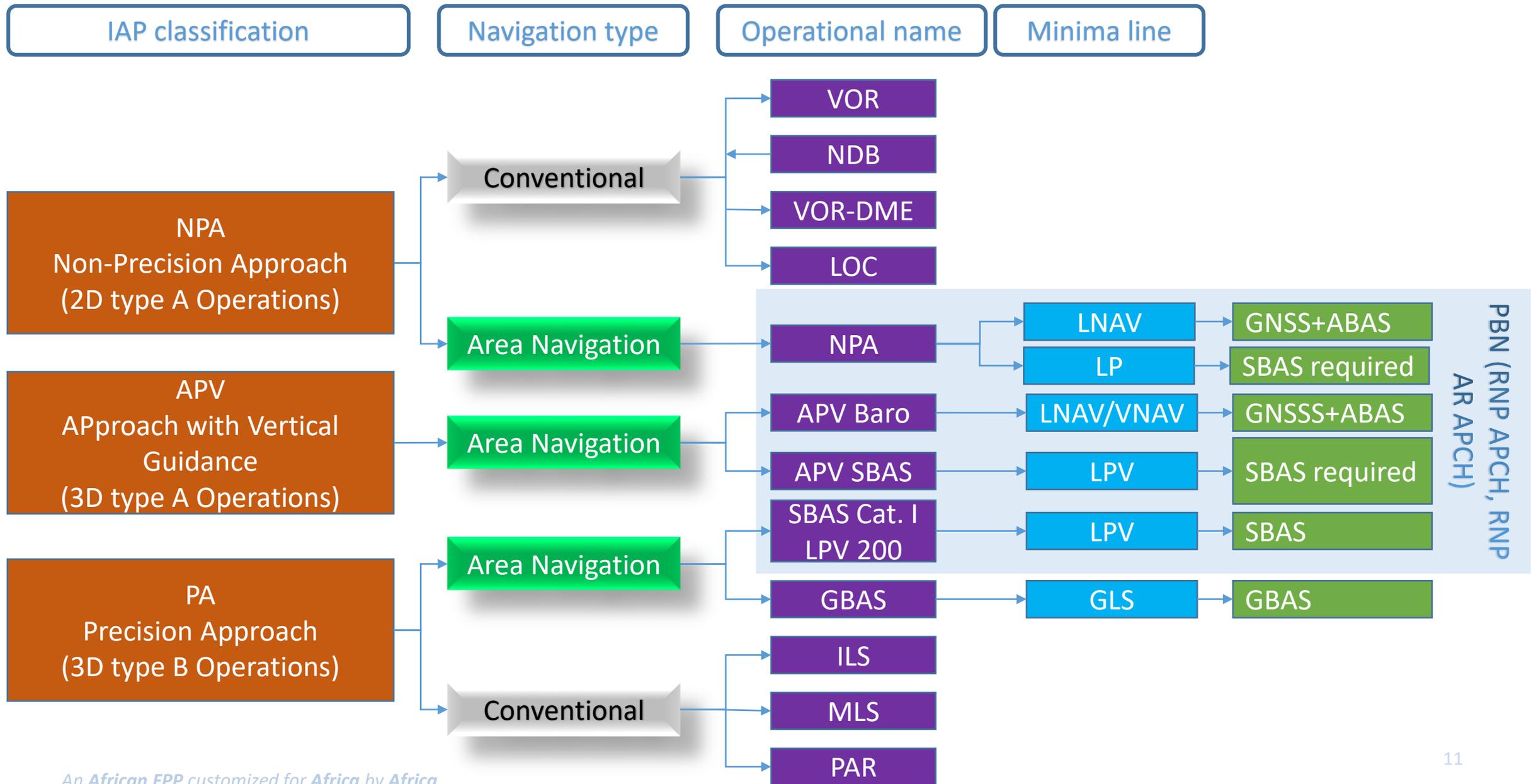
□ Many possible classifications:

- ☞ Visual procedures vs instrument procedures;
- ☞ Conventional vs PBN.

□ Flight procedures are design for all phases of flight:

- | | | |
|-------------------|----------------------------|-----------------------|
| ☞ En-route phase | En-route procedures | En-route charts |
| ☞ Arrival phase | Arrival procedures | STARs chart |
| ☞ | Omnidirectional arrival | |
| ☞ Approach phase | Approach procedures (IAP) | Approach charts (IAC) |
| ☞ | Visual approach procedures | |
| ☞ Departure phase | Departure procedures | SIDs chart |
| ☞ | Omnidirectional departures | |

☞ *This training will focus on conventional Arrival, Approach and departure procedures.*





Flight procedure design characteristics

African Flight Procedure Programme (AFPP)

□ Flight procedures are designed under specific criteria for each segment:

☞ Minimum, maximum and optimum values:

- Length;
- Slope or gradient;
- Speed;

☞ Bank angle;

☞ Protection parameters;

☞ Turn angles;

☞ Connection rules with the other segments;

☞ Etc.



☐ ICAO regulation:

- ☞ Doc. 8168 – PANS-OPS;
- ☞ Doc. 9905- RNP AR;
- ☞ Doc, 9906- Quality Assurance;
- ☞ Doc. 8697- Aeronautical chart;
- ☞ Airspace design docs: Doc. 9931-CDO, Doc. 9992-Airspace, Doc. 9993-CCO;
- ☞ Etc.

☐ National regulation as applicable.

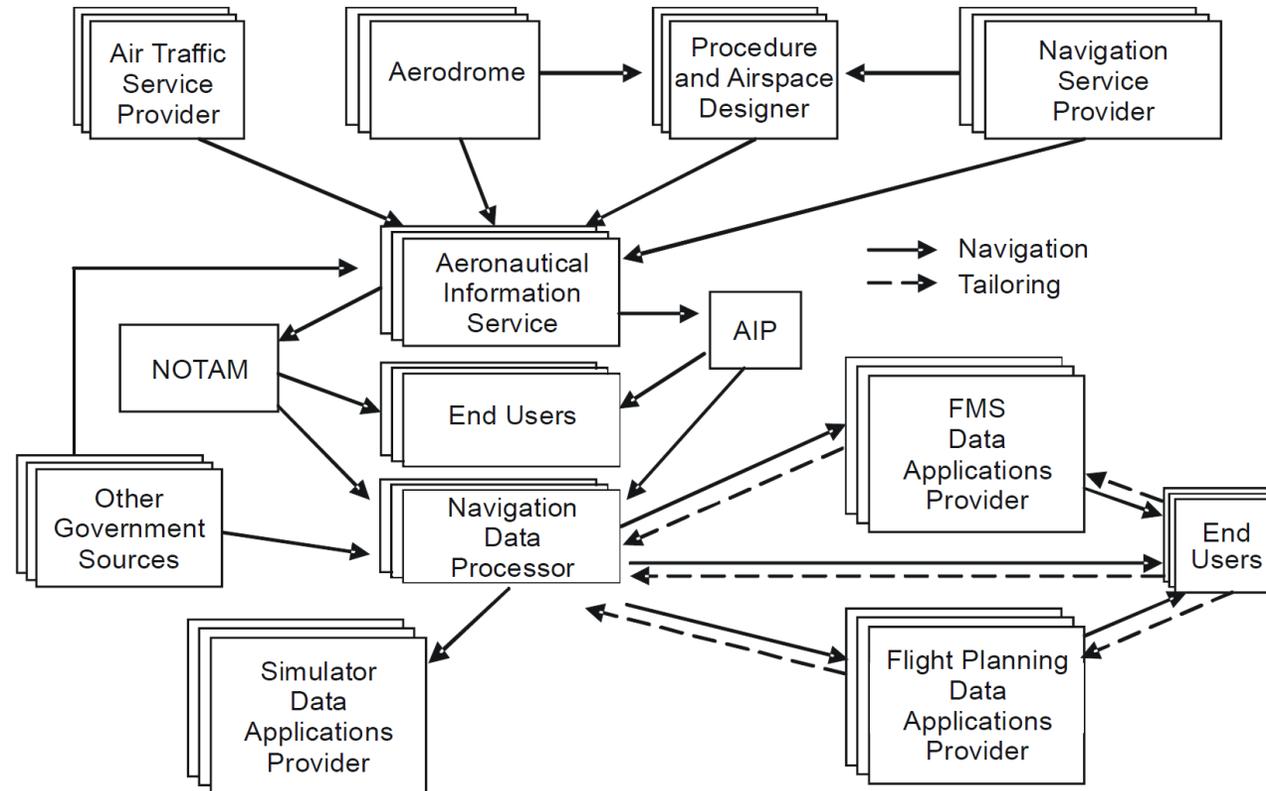


Figure 1. Participants in the development of an IFP.



Flight procedure deliverables

African Flight Procedure Programme (AFPP)

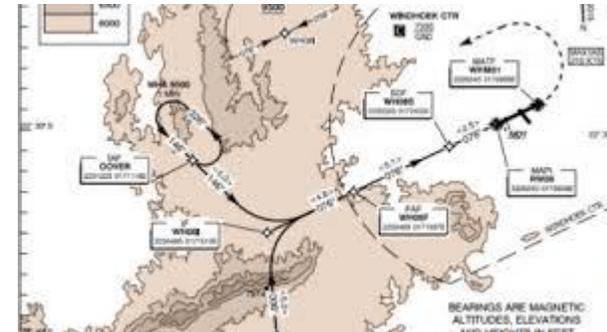
□ The final product of flight procedures:

☞ Aeronautical charts;

- Instrument approach chart;
- SIDs of STARs chart;
- En-route chart;
- Etc.

☞ A coding table (PBN) and finally

☞ A navigation data base.



AERONAUTICAL CHART MANUAL of Chapter 7.11
 INSTRUMENT APPROACH CHART — ICAO
 AERODROME ELEV 30 m
 HEIGHTS RELATED TO THR RWY 27L — ELEV 20 m
 SPECIMEN CHART
 DONLON/Intl (EADD)
 RNP W RWY 27L

TABULAR DESCRIPTION

RNP W RWY 27L											
Serial Number	Path Descriptor	Waypoint Identifier	Fly-Over	Course "M(T)"	Magnetic Variation	Distance (km)	Turn Direction	Altitude(m)	Speed (kts)	VSI/ TCH	Navigation Specification
010	►	TOMLE	•	•	•	•	•	+1200	•	•	RNP APCH
020	TF	DD900	•	268(264,3)	•	1/4	•	+800	•	•	RNP APCH
010	►	DUCLU	-	-	-	-	-	+1200	-	-	RNP APCH
020	TF	DD900	-	358(355,3)	-	1/2	•	+800	-	-	RNP APCH
010	►	ROBLE	•	•	•	•	•	+1200	•	•	RNP APCH
020	TF	DD900	•	178(175,3)	•	1/2	•	+800	•	•	RNP APCH
010	►	DD900	-	-	-	-	-	+800	-	-	RNP APCH
020	TF	DD601	-	268(265,3)	-	1/2	•	1015	-	-	RNP APCH
030	TF	RW27L	Y	268(265,3)	•	1/2	•	035	•	15	RNP APCH
040	FA	RW27L	•	268(265,3)	+30	•	•	•	•	•	RNP APCH
050	DF	DD904	-	-	-	-	-	-	-	-	RNP APCH
060	TF	DD905	•	178(175,3)	•	1/2	L	•	410	•	RNP APCH
070	TF	DUCLU	-	080(085,3)	-	1/2	L	+1200	-	-	RNP APCH
080	HM	DUCLU	-	350(350,3)	-	-	R	+1200	-	-	RNP APCH

¹⁾ This value is provided by industry.

WAYPOINT LIST





Questions:

Alexandre DAMIBA
adamiba@icao.int