INTERNATIONAL CIVIL AVIATION ORGANIZATION
EASTERN AND SOUTHERN AFRICAN OFFICE

WORKSHOP ON THE DEVELOPMENT OF NATIONAL PERFORMANCE FRAMEWORK FOR AIR NAVIGATION SYSTEMS
(NAIROBI, 6-10 DECEMBER 2010)

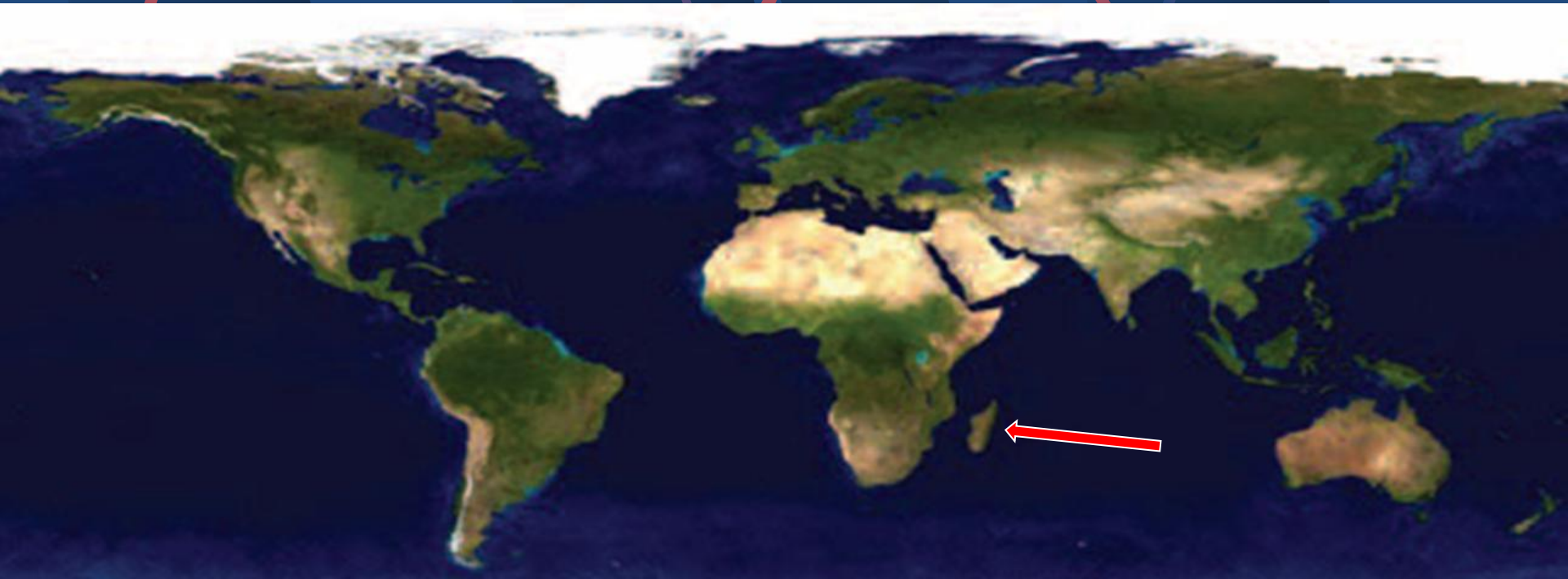
WORKSHOP EXERCISE
MADAGASCAR AIR NAVIGATION PLAN

Content

- Characteristics of the industry
- The air navigation service provider
- Major stakeholders/partners
- Problem definition
- Performance based National ANP
- Performance framework forms (PFFs)
- Risk Management

Madagascar Profile

- **MADAGASCAR is the fourth biggest Island in the word. It is an ASECNA State members.**
- **Located in the Indian Ocean region, with its 581.540 Sq. Km and 20 millions of population.**



Characteristics of the industry (1/2)

Year	2007	2008	2009	2010	2011	2012	2013
Domestic Mouvement	17262	14640	12504	12090	11690	11303	10929

Year	2007	2008	2009	2010	2011	2012	2013
International Mouvement	5961	6443	6235	6462	6698	6942	7195

Characteristics of the industry (2/2)

- Projected Growth is 3.5% per annum for next 3 years
- Need of safety assessment and monitoring for reduced horizontal separation implementation
- Antananarivo FIR: 70% oceanic airspace

The air navigation service provider

- ASECNA
- the Agency for the safety of Aerial Navigation in Africa and Madagascar provides air navigation service for Madagascar FIR. It manages the upper airspace and three main aerodromes.
- The headquarters is located in Dakar , Senegal and each State member have local representative.

- Others private operators and NGOs manage small aerodromes , such as ADEMA, TOKY, etc..

Major stakeholders/partners

- Air Navigation Service Providers
  - ASECNA
  - ADEMA
- ICAO and IATA
- Commercial Airline Operators
  - Local and foreign registered airlines
- General Aviation, and
- Local Airspace Users (Military, etc)

Problem definition

- Conventional air navigation systems (NDB, VOR, DME and ILS) have several limitations such as:

- Very limited accuracy
- Propagation limitation
- Difficulty to maintain (costly)
- Sensitive to vandalism acts
- Limited surveillance over oceanic areas
- Lack of predictability of aircraft tracks

Performance based National Air Navigation Plan

- Implementation of two RNAV routes:
  - UG 652 and
  - UG 661)
- Implementation of ADS-C/CPDLC
- Implementation of RNAV/GNSS SIDs and STARs/approach procedures at Ivato, Tamatave and Majunga international airports.
- Harmonization with the neighboring FIRs (optimized ATS route structure, CDM, Regional Flow Management, etc.

Performance framework forms (PFFs)

Three Performance Framework Forms were developed in Antananarivo FIR:

- **Enhance the surveillance capability**
- **Increase en-route airspace capacity**
- **Improve predictibility of flight trajectory**

(see Appendix)

Risk Management

- Fly-ability of RNAV/GNSS SIDs and STAR for aircraft –conduct of flight simulation;
- Misunderstanding of Flow Management Concept by the pilots which could lead to safety concerns- Numerous engagement with airlines operators and pilots;
- Insufficient Funding and Human Resources;
- Incompatibility between system implementation and advancement in technology.

Risk Mitigation

- **Insufficient Funding**

- seek for funding approval

- scale down implementation plan

- **Insufficient Human Resource**

- speed up training process (identify and …)

- strengthened Establishment

- **Incompatibility between system implementation and advancement in technology.**

-closely monitor development in technology and ICAO guidance and SARPs;

- Identify training needs.

Thank you for your kind attention

PERFORMANCE FRAMEWORK FORM

REGIONAL PERFORMANCE OBJECTIVES /NATIONAL PERFORMANCE OBJECTIVE ENHANCE THE SURVEILLENCE CAPABILITY IN ANTANANARIVO FIR				
Benefits				
	• Enhance safety • Enhance ATC situational awareness and traffic management • Enhance ATC performance, e.g. reduction of stress • Reduced separation requirement, increase the airspace capacity • Ability of aircraft to conduct flight more closely to preferred trajectories • Reduce ground delay • Enhance surveillance capacity			
Strategy ***Medium term (1999 - 2003)***				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
	En-route airspace			
AOM **ATM** **SDM**	• Analyze the airspace applicable for ADS-C implementation	1999-2000	ASECNA	Completed
	• Implement ADS-C to cover Antananarivo continental FIR	2000 - 2003	ASECNA	Completed
	• CPDLC implementation	2002 – 2003	ASECNA	Completed
	• Discussion with neighbouring FIR on regional cooperation plan	2010 – 2011	ASECNA	On going
	• Training for relevant personnel	2001 -2003	ASECNA	Completed
	• Review the implementation progress;	2003– 2011	ASECNA	Planning
linkage to GPIs	GPI 7: dynamic and flexible ATS route management, GPI 8: collaborative airspace design, GPI-9: situational awareness; GPI-16: decisión support and alerting systems, GPI 22: communications infrastructure			

PERFORMANCE FRAMEWORK FORM

REGIONAL PERFORMANCE OBJECTIVES /NATIONAL PERFORMANCE OBJECTIVE INCREASE EN-ROUTE AIRSPACE CAPACITY				
Benefits				
	• Reductions in fuel consumption and carbon emissions • Ability of aircraft to conduct flight more closely to preferred trajectories • Reduce ground delay • Trans-FIR usage of reduced horizontal separation • Increase in airspace capacity • Monitoring of implementation			
Strategy **Short term (2007-2008)**				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
	En-route airspace			
AOM DCB	• Analysis the en-route ATS routes structure and implement reduce horizontal separation on suitable ATS routes	2007	ASECNA	Completed
	• Implement RNP 1O on UG 652 & UG 661	2007	ASECNA	Completed
	• Monitor implementation progress	2007	ASECNA	Completed
	• Plan to implement RNP4 on UG 652 & UG 661	2009 - 2011	ASECNA	Ongoing
	• Promulgation of information by AIP SUPP	2008	ASECNA	Completed
linkage to GPIs	GPI 5: RNAV and RNP, GPI 7: dynamic and flexible ATS route management, GPI 9: situation awareness, GPI 17: data link applications, GPI 21: navigation system and GPI 22: communications infrastructure			

PERFORMANCE FRAMEWORK FORM

REGIONAL PERFORMANCE OBJECTIVES /NATIONAL PERFORMANCE OBJECTIVE IMPROVE PREDICTIBILITY OF FLIGHT TRAJECTORY	
Benefits	
	• Optimize Utilization of arrival slots • Reduce Overall Arrival Delay • Reductions in fuel consumption and carbon emissions • Reduce pilots' workload due better track predictability • Enhance safety • Enhance situational awareness • Increase in terminal airspace capacity • Enhanced traffic management

Strategy
Short term (2000 - 2005)

ATM OC COMPONENTS	TASKS	TIMEFRAME START-END	RESPONSIBILITY	STATUS
	Terminal airspace			
AOM **AO** **CM**	• Development of RNAV SIDs and STARs	2000	ASECNA	Completed
	• Flight simulation	2001	ASECNA	Completed
	• Engaging stakeholders	2005	ASECNA	On going
	• Flight checks for validation of RNAV SIDs and STARs	2003 - 2004	State/ASECNA	Completed
	• Implementation of RNAV SIDs and STARs	2005	ASECNA	Completed
	• Monitor the implementation progress	2005 - 2010	State/ASECNA	On-going
linkage to GPIs	GPI 5: area navigation and required navigation performance, GPI 8: Collaborative airspace design and management, GPI 9: situation awareness, GPI 10: terminal area design and management, GPI 11: RNP and RNAV SIDs and STARs, GPI 21: navigation systems			