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Agenda Item 4: **GASR Projects**
• GSI/3 – Effective Errors and Incidents Reporting
Status of Project 1 – ***Effective flow of hazard information***

IMPLEMENTATION OF ATM AUTOMATED SYSTEMS IN THE CAR/SAM REGIONS

(Presented by the Secretariat)

SUMMARY

This working paper presents a summary of the aspects for implementation of ATM automation within the framework of GREPECAS, in consideration of the Action Plans developed by the States.

References:

- GREPECAS/12, 13 and 14 Meeting Reports.

Strategic Objectives	*This working paper relates to Strategic Objectives A and D.*

1. Regional Strategy for Automated Systems

1.1 GREPECAS Conclusion 12/31 – *Regional strategy for the integration of ATM Automated Systems* encouraged States/Territories/International Organizations to define an action plan for the integration of ATM automated systems using the strategy contained in **Appendix A** to this working paper.

1.2 GREPECAS Conclusion 14/43 – *Agreements for ATM Automated Systems Interface* urged the States/Territories/International Organizations to take into account technical feasibility studies and operational benefits, establish bilateral and multilateral agreements for the interface of automated systems between adjacent units, and use the *"Interface Control Document for Data Communications between ATS Units in the Caribbean and South American Regions (CAR/SAM ICD).* The ICD is published on the ICAO CAR and SAM Regional Offices web pages under "e-Documents."

1.3 GREPECAS Conclusion 14/44 – *Establishment of an Action Plan for the Interface of ATM Automated Systems* encouraged States/Territories/International Organizations to formulate an Action Plan for the interface of ATM automated systems using the Table of ATS Operational Requirements for Automated Systems.

2. Discussion

2.1 More than 90% of air traffic control centres and ATS units in the CAR/SAM Regions have been modernized allowing for greater data processing capacity and safety improvement through implementation of flight data processing systems (FDPS), radar processing (RDP), support systems and other message displays and switching systems, thus improving service efficiency and volume with a considerable increase of applicable prevention tools (MSAW, DAIW, MTCA, etc.) This system automation is in accordance with GREPECAS guidelines regarding classification and provision of airspace service.

2.2 In accordance with the analysis and data provided in Surveillance Systems contained in the FASID Table, as well as new surveillance systems such as ADS-B, Mode S and multilateration, it is noted that there are surveillance radar and non radar data sources available that may be useful to improve precision, availability and safety of ATC service provision.

2.3 In line with the previous considerations and taking into account the regional strategy approved by GREPECAS, the States have defined specific actions to achieve Phase I and II of this strategy by including them in their corresponding national action plans.

Interface Control Document for Data Communications between ATS Units (ICD)

2.4 The purpose of this document is to provide a common model for data exchange among ATS units in the CAR/SAM Regions, as well as the provision of an instrument to coordinate changes to this model. The ICD proposes the use of coordination messages among ATS units, especially for flight plan coordination and radar transfer, based on Doc 4444 and several particular messages that can be adjusted for identified needs of each automated system.

2.5 The ICD complies with the ATS message coordination requirements and, at the same time, allows development of Phases I and II and the evolution of the regional automation strategy through the definition of required messages for the foreseen initial ATFM implementation and control transference of ADS data. The interface activities are coordinated between the specialists of States involved.

National Action Plan for the Implementation of ATM Automated Systems Interface among ATS Units – Improvement and Development of the ATM Situational Awareness

2.6 Radar systems and related automated systems are an element that improves ATS efficiency. It is necessary to stress that when service efficiency improves, ATS safety also improves.

2.7 In view that most CAR/SAM States have implemented automated systems, the Meeting should note that States have developed national action plans for ATM automated systems interface among adjacent ATS units, establishing improvement of ATM situational awareness as per ATS performance objectives approved by GREPECAS, which are included in **Appendix B** to this working paper. ICAO NACC and SAM Offices work closely with States to ensure harmonized implementation of ATM automated systems in the CAR/SAM Regions.

3. Suggested Action

3.1 The Meeting is requested to:

a) take note of the information contained in this working paper;

b) analyze the progress implementation, taking into account the regional strategy approved by GREPECAS; and

c) consider and recommend other actions as deemed appropriate.

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APPENDIX A

GUIDELINES FOR STRATEGY OPERATIONAL INTEGRATION OF THE ATM AUTOMATED SYSTEMS OF THE CAR/SAM REGIONS

Objective: Through a committed participation of the States, users and ATS providers of the CAR/SAM Regions,

1) to cooperate jointly in the integration of technologies for ATM automation, in accordance with ICAO guidelines available, considering the best regional and global alternatives;

2) develop a strategy for the integration of ATM automated systems with a safe, gradual, evolutionary and interoperable vision that facilitates the information exchange and the collaborative decision-making of all the components of the ATM system for a seamless, flexible, optimum and dynamic management of airspace and international aerodromes, and at the same time that it increases the required operational safety levels.

3) take into account the data processing and network environment, taking into consideration the use of ground and space segments for an interactive ATS information process, under the criteria of integrity, quality and real time.

FRAMEWORK

a) identify homogeneous areas on the basis of traffic flows operating in the different airspace and international aerodromes;

b) analyze the operational environment scenarios of the air traffic services currently provided and those that are planned;

c) determine the scope, architecture design, characteristics and attributes of the operational requirements for the short-term integration of the current automated systems of the ATS units depending on the current provided service levels, as well as other operational requirements that respond to future expectations of the components of the ATM system, considering:

i) arranging the requirements in logical sequence, through the following stages.

Stage	Function
Stage I	- **Flight plan processing** (FDPS/Flight Data Processing System)
Stage II	- **Radar data processing** and ATS surveillance (RDPS/Radar Data Processing System, ADS and exchange of radar information); - **Monoradar;** - **Multiradar**; - **Radar data sharing**.
Stage III	- **Automated** digital communications (radar control transfer/automated traffic hand off, AIDC/CPDLC, etc.).

Stage	Function
Stage IV	- Implementation of CDM (Collaborative Decision Making) for other ATM requirements (AOM [Airspace Organization and Management], CM [conflict management], DCB [Demand/Capacity Balancing], AO [Aerodrome Operation], TS [Traffic Synchronization], AUO [Airspace User Operation], ASDM [ATM Service Demand Management], AIS, Meteorology, Statistics, etc.);

NOTE: SAR should be taken into consideration in all the lower airspace stages.

ii) identify the automation level required according to ATS functions defined in States´ classification of airspace and international aerodromes, as follows:

ATS Operational functions required in the automated systems (ATC, FIS, SAR)							
APPLICABLE	**ATS Airspace**						
ATS FUNCTIONS	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Identification							
Separation							
Navigation guide							
Surveillance							
Transfer							
Coordination							
Information of flight plans in real time							
Visualization of the geographical position of the aircraft (longitude, latitude, history)							
Statistical data of flight plans (past and forecasted information).							
Radar data processing system (RDPS)							
Flight data processing system (FDPS)							
ATS inter-facility data communications (AIDC)							
Controller-pilot data link communications (CPDLC)							
Flight profile information (altitude, vertical speed, offset speed, predictive vector, turn angle, etc.)							
Automatic alerts (STCA, MSAW, DIAW, emergency, communication failure, unlawful interference, etc.)							
AIS Interface							
Meteorological information							

iii) define the incoming and outgoing data, and functional interfaces data applicable to functions and sub-functions of the service;

iv) define from the highest to lowest level the functional decompositions for all the ATM components;

v) successively determine the different operational applications from the functional level or lowest interface to the upper interface;

vi) define the current and future operational application needs;

vii) determine the short-term operational requirements; and

viii) determine the future operational requirements.

d) determine the existing facilities and technological equipment in the CAR/SAM Regions, especially in adjacent States/Territories/Organizaitons, as well as the inter-operability technical requirements, data bases, equipped aircraft, software tools, etc., required that ease the integration of automated systems;

e) develop a cost-benefit analysis for integrated implementation of ATM automated systems;

f) establish bilateral and multilateral agreements, as appropriate, among States/Territories/International Organizations of adjacent airspaces and regions for trials and the operational implementation/integration of ATS automated systems;

g) develop standards, procedures and guidance material required (as *the Interface Control Document (ICD) for data communications and common coordination between ATM centres, based on ICAO SARPs*) for the functional operation of ATS automated systems, including critical contingency cases to serve as an aid to users;

h) take the necessary measures regarding relevant training on a national and regional basis, allowing for the facilitation of implementation/integration of ATS automated systems;

i) identify other potential benefits for the ATM community that may be obtained in the long-term; and

j) document an action plan for interoperable implementation of ATS automated systems.

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APPENDIX B

IMPROVE ATM SITUATIONAL AWARENESS			
Benefits			
Efficiency	• enhanced traffic surveillance; • enhanced collaboration between flight crew and the ATM system; • improved collaborative decision-making through sharing electronic aeronautical data information; • reduced of workload for both pilots and controllers; • improved operational efficiency; • enhanced airspace capacity; • improved implementation on a cost-effective basis;		
Safety	• improved available electronic terrain and obstacle data in the cockpit; • reduced of the number of controlled flight into terrain related accidents; and • improved safety management.		
Strategy ***Near term (2010)***			
TASK	**DESCRIPTION**	**START-END**	**STATUS**
SDM	• identify parties concerned • identify the automation level required according to the ATM service provided in airspace and international aerodromes, assessing o operational architecture design, o characteristics and attributes for interoperability, o data bases and software, and o technical requirements;		
	• improve ATS interfacility communication		
	• implement flight plan data processing system and electronic transmission tools		
	• implement radar data sharing programs where benefits can be obtained		
	• develop situational awareness training programmes for pilots and controllers		
	• implement ATM surveillance systems for situational traffic information and associated procedures		
	• implement ATS automated message exchanges, as required o FPL, CPL, CNL, DLA, etc.		
	• implement automated radar handovers, where able;		
	• implement ground and air electronic warnings, as needed o Conflict prediction o Terrain proximity o MSAW o DAIW o Surveillance system for surface movement		
	• implement data link surveillance technologies and applications: ADS, CPDLC, AIDC, as required.		

Medium term (2015)			
	• implement additional/advanced automation support tools to increase sharing of aeronautical information o ETMS or similar o MET information o AIS/NOTAM dissemination o Surveillance tools to identify airspace sector constraints o A-SMGC in specific aerodromes, as required		
	• implement teleconferences with ATM stakeholders		
	• monitor implementation progress		
References	GPI/1: flexible use of airspace; GPI/6: air traffic flow management; and GPI/7: dynamic and flexible ATS route management; GPI/9: Situational awareness; GPI/13: aerodrome design and management; GPI/14: runway operations; and GPI/16: decision support and alerting systems; GPI/17: implementation of data link applications; GPI/18: aeronautical Information; GPI/19: meteorological systems.		

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