International Civil Aviation Organization
South American Regional Office
Meeting of Air Navigation and Safety Directors of the SAM Region
(Lima, Peru, 21 to 22 October 2013)

Agenda item 2:   **Analysis of performance indicators and metrics for the implementation of air navigation and safety efficiency and capacity improvements**

SAFETY

(Presented by the Secretariat)

SUMMARY
This working paper (WP) presents an analysis of the performance indicators, targets and enhancements being proposed for the following SAM Region safety areas: ✓ safety oversight;   ✓ accidents;   ✓ runway excursions and incursions;   ✓ aerodromes certification; and   ✓ State safety programme (SSP) and safety management system (SMS) implementation.
References
• Global coordination meeting (GCM) of the Planning and implementation regional groups (PIRG) and Regional aviation safety groups (RASG) (Montreal 19 March 2013)   • First edition of the ICAO Global aviation safety plan (GASP), revised version, (Doc 10004, 2013)   • A38-XX Resolution –*ICAO global planning for safety and air navigation*
ICAO Strategic Objectives: *A – Safety*

1.   **Introduction**

1.1   The Global coordination meeting (GCM) of the Planning and implementation regional groups (PIRG) and Regional aviation safety groups (RASG) (Montreal, Canada, 19 March 2013), chaired by the ICAO Council President, agreed on the need of measuring performance improvement, backing up performance regional registry and establishing a group of indicators and metrics.

1.2   Taking into account the agreements reached by the PIRG and RASG Global coordination meeting, and the principle of transparency in the use of shared information, ICAO is leading the creation of the *safety performance dashboard* in the web page of each ICAO Regional Office in order to measure performance of the following safety areas:

✓ safety oversight;

✓ accidents;

✓ runway excursions and incursions;

✓ aerodromes certification; and

✓ State safety programme (SSP) and safety management system (SMS) implementation.

1.3   The *safety performance dashboard* will permit a safety measure-based management in the States and the SAM Region. The rationale of this approach is based on the following fundamental principles:

✓ Work by results; and

✓ Management based in measuring.

1.4   In this regard, the First edition of ICAO Global aviation safety plan (GASP), revised version, (Doc 10004, 2013), establishes that continuous enhancement of global aviation safety is fundamental for guaranteeing that air transport continues with the important function of promoting sustainable economic and social development in the whole world.

1.5   This revised version of the GASP also establishes the global objectives for air navigation safety, as well as *the milestones and specific priorities* that States regional planners should take into account for the enhancement of aviation safety.

2.   Safety performance indicators, targets and enhancements

For the planning of aviation safety in the SAM Region, the analysis of safety performance indicators, targets and enhancements has been carried out.

3.   Deadlines for the efficient implementation of safety targets and enhancements

3.1   For the effective implementation of targets and safety enhancements of the SAM Region, several deadlines have been considered.

4.   Analysis of safety performance indicators, targets and enhancements

4.1   S*afety oversight*

4.1.1   Performance indicators for this area have been defined based on results [effective implementation (EI)] obtained by each SAM Region State in the last activity carried out in terms of the ICAO Universal safety oversight audit programme (USOAP) continuous monitoring approach (CMA), either, in an audit under the comprehensive systems approach (CSA) or in an ICAO coordinated validation mission (ICVM).

4.1.2   During the period 2011-2013, five ICVMs were carried out in the following States: Colombia, Ecuador, Suriname, Argentina and Venezuela. The results of these five ICVMs improved the effective implementation rate (EI) of the SAM Region in **4.37%**. Considering this improvement rate, the SAM Region could reach an EI rate of 80% in the next three years (2014-2016), if four CMA activities at least are held each year.

4.1.3   In *Appendix A* to this WP, an analysis of safety indicators and proposals for targets and enhancements is being presented

4.2   *Accidents*

4.2.1   Performance indicators in this area were obtained through the evaluation of information available at ICAO web site named: Occurrences – Pivot table on iSTARS accidents statistics. The sample information is referred scheduled commercial air transport with aircrafts above *2250 kg* within **period 2005-2012**.

4.2.2   Through the information obtained from the above mentioned table it could be noted that the SAM Region reduced accidents gradually from year 2005 on, with the exception of year 2008, in which the accidents rate was abruptly incremented. Also, it could be noted that the accidents rate for the last part of 2011, although it was above the global rate, did not double the referred rate, therefore the SAM Region achieved the 2007 GASP Third objective.

4.2.3   The information provided by the Commercial aviation safety team (CAST), from the United States government aviation industry, was also used. The accidents analysed occurred in the SAM Region during period 2002-2012, corresponding to LAR 121 operators or equivalent. In this study, the CAST utilized a value of application of 50% over nine (09) safety enhancements (SE).

4.2.4   In order to establish the proposals of performance targets in this area, the following method was used:

4.2.4.1   **Method based on a retrospective risk analysis process using safety enhancements.-** This method is based on information provided by the Commercial aviation safety team (CAST) of the United States government aviation industry, which carried out a risk analysis on the accidents occurred in the SAM Region during the period 2002-2012, where the following nine (09) safety enhancements (SE) of the Regional aviation safety group – Pan American (RASG-PA) were applied: *RE/04, RE/09, CFIT/02, CFIT/04, LOC-I/06, LOC-I/07, LOC-I/9, RE/8 y RE/11*. Based on this analysis, CAST was able to obtain the rate of accidents that could have been avoided during the period 2002-2012 in the event of having applied the referred enhancements before the accidents occurred. Based on the result of this study, a performance safety target of **3.72** annual accidents per each million departures is proposed for the period 2014-2018.

4.2.5   In *Appendix B* to this WP an analysis of indicators and proposals for safety targets and enhancements is being presented.

4.3   *Runway excursions and incursions*

4.3.1   The runway excursions performance indicators were obtained from ICAO Accident/Incident data reporting system (ADREP). This information corresponds to scheduled and non-scheduled commercial air transport aircrafts above **5 700 *kg*** within the period 2005-2012.

4.3.2　　　　Analysing this information, it can be observed that during years 2007, 2008, 2009 and 2011 an abrupt increment in the accident rates corresponding to runway excursions occurred. However, in the following years 2010 to 2012, this rate decreased, reaching zero accidents in year 2012.

4.3.3　　　　In order to establish the performance targets of this area and complementary safety enhancements, the SAM Region average rate by runway excursions in the period 2005-2012 was taken as the safety performance indicator, corresponding to **1.56 accidents per million of departures**. No safety targets or enhancements were established for runway incursions since no accidents were reported for this cause in the SAM Region

4.3.4　　　　For the next three years (2014-2016), the performance target proposal for runway excursions in the SAM Region is **1.56**, which is a rate no greater than the Region's average for period 2005-2012.

4.3.5　　　　*Appendix C* to this WP presents an analysis of safety indicators and proposal of targets and enhancements for this category of accidents.

4.4　　　　*Aerodromes certification*

4.4.1　　　　Information on this area is being presented in WP/05.

4.5　　　　*SMS/SSP implementation*

4.5.1　　　　Information on this area is being presented in WP/12.

5.　　　　Suggested actions

　　　　The meeting is invited to:

a) take knowledge of the information presented in this working paper and appendices; and

b) analyse and comment on:

✓ safety performance indicators; and

✓ proposals for safety targets and enhancements.

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Appendix A

Safety oversight

1. Safety performance indicators

1.1   SAM Region reached an effective implementation (EI) rate of 70%, once Colombia, Ecuador, Suriname, Argentina and Venezuela, were subject of an ICAO Coordinated validation mission within the period 2011 to 2013.

1.2   According to Table A-1 – Average effective implementation by State, seven (7) States (Brazil, Panama, Argentina, Chile, Venezuela, Colombia and Bolivia) are above the Region's average; two (2) States (Peru and Ecuador) are very close to reach the average; and four (4) States (Suriname, Paraguay, Guyana and Uruguay) are below the referred average.

Table A-1 – Average effective implementation (EI) by State
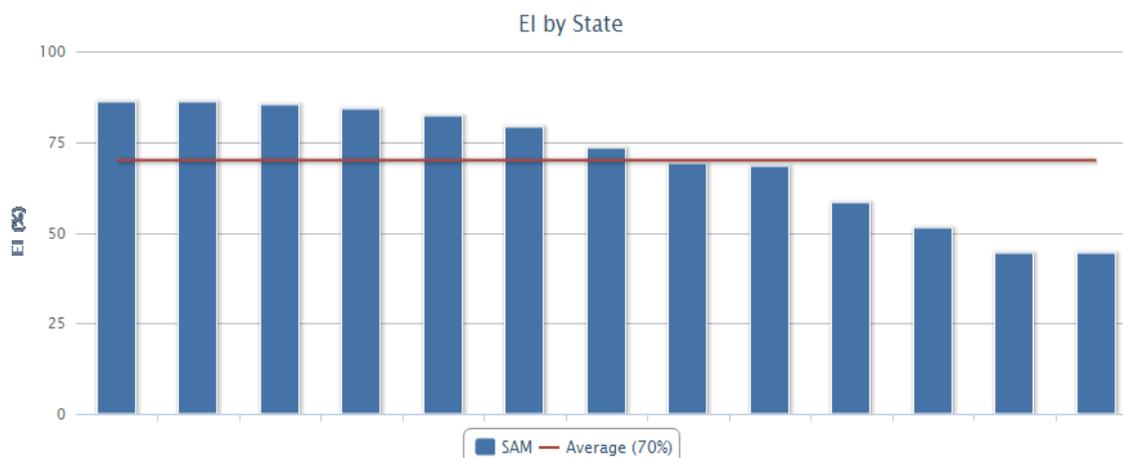
1.3   As result of this five ICVMs, the SAM Region average effective implementation (EI) increased from 66.31% to **70.68%**, namely **4.37%**, which represents an improvement average by State of approximately **0.87%.**

1.4   After ICVMs, SAM States improved their EI as follows: Argentina improved in **9.1%**, Colombia in **16%**, Ecuador in **12.4%**, Suriname in **9.6%** and Venezuela in **10.9%**.

1.5   To improve the SAM Region general effective implementation (EI) rate, it is required that Peru, Ecuador, Suriname, Paraguay, Guyana and Uruguay show progress in the solution of findings reported in ICAO Universal safety oversight audit programme (USOAP) continuous monitoring approach (CMA) activities or in the last audit cycle carried out according to the comprehensive systems approach (CSA). The Regional Office will continue providing support to States with direct and continuous advisory in the preparation of their CAP to face USOAP CMA activities.

1.6   In Table A-2 – Average effective implementation (EI) by audit area, it can be observed that the areas of LEG, PEL, OPS and AIR are above the average of the Region, ORG and AIG are slightly below de average, and ANS and AGA are below the average.

1.7   To improve the SAM Region effective implementation rate by audit areas it is necessary to put special emphasis in the attention of the areas of ANS (53%), AGA (66%), AIG (69%) and ORG (69%) in most of the States.

Table A-2 – Average effective implementation (EI) by audit area
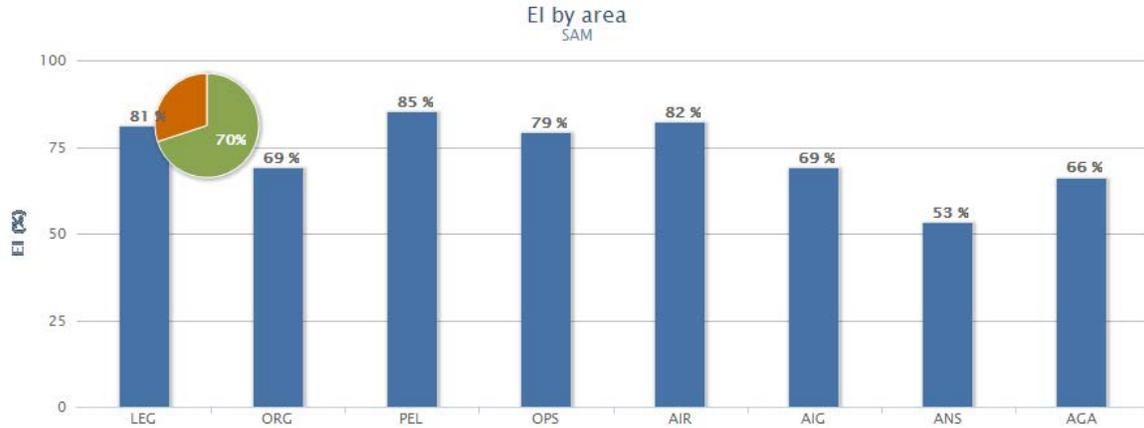
1.8   In Table A-3 – Average effective implementation (EI) by critical element (CE), it can be seen that CE 1, 2, 5 and 6 are above the average, while CE 3, 4, 7 and 8 are below de average, being CE-4 – Technical personnel qualification and training to be improved the most. CE-4 shows an EI of 46%.

Table A-3 – Average effective implementation (EI) by critical element
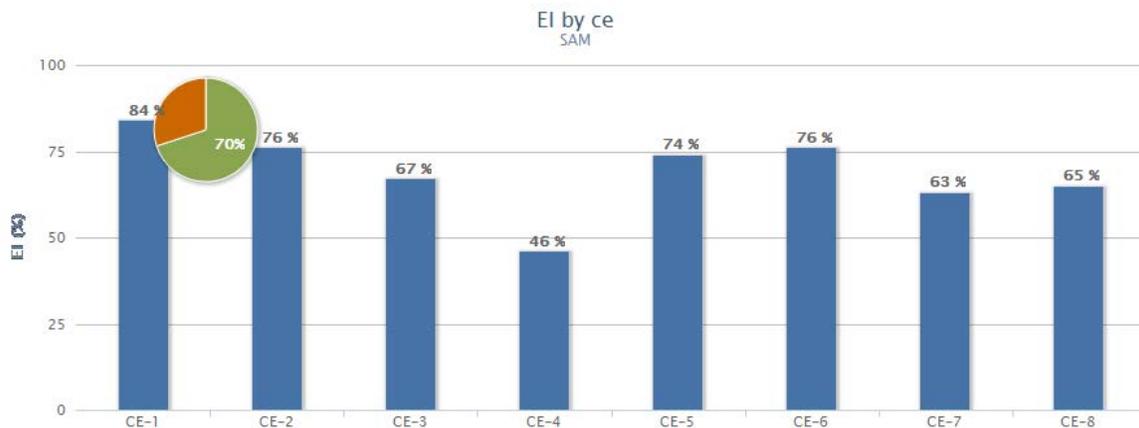
1.9   To improve CE-4, States should implement definition and competence control effective systems.   Competence definition involves issues such as the availability of a job description manual that include a profile for each safety inspector post, also the requirements of **knowledge, experience and abilities** for each task being performed by the inspectors should be established so that the inspectors can perform effectively their tasks. A safety inspector should not be assigned tasks without supervision if no documented evidence is available proving his capacity to perform the task, in both areas: certification or surveillance.

2.   Proposal for safety performance targets

2.1   Performance targets translated to percentages will be considered the parameters that the SAM Region should achieve in the following three-year periods:

- ✓ Short term (January 2014 - December 2016):

  - ➢ Same or above **80%**

- ✓ Medium term (January 2017- December 2019):

  - ➢ The target of this period will be determined based on the performance of the previous period.

- ✓ Long term (January 2020 – December 2022)

  - ➢ The target of this period will be determined based on the performance of the previous period.

3.   Proposals for safety enhancement

3.1   Improvement in the SAM Region effective implementation (EI) average

3.1.1   The Regional South American Office will encourage SARPs effective implementation in its States, especially in those States showing a rate below the established targets. The objective of this action is that each State improves its EI in order that the SAM Region is able to reach the targets agreed upon by the meeting. Therefore, SAM States are encouraged to commit themselves to maintain updated and to improve their corrective action plans (CAPs).

3.1.2   Additionally to the CAPs improvement, the following specific safety enhancements for the SAM States and for the Regional Safety Oversight Cooperation System (SRVSOP) States are being proposed for the short term period (January 2014 - December 2016):

3.1.3.1   For SRVSOP States:

- ✓ regulations harmonization;

- ✓ inspectors guidance material harmonization;

- ✓ service providers guidance material harmonization, for example, advisory circulars (AC), acceptable means of compliance (AMC) and interpretative and explanatory material (IEM)

- ✓ Assistance to the States that require it in the following areas:

  - ➢ training;

  - ➢ certification; and

  - ➢ approvals

✓ effective implementation of the following surveillance systems for air services operators:

➢ Safety ramp inspections data exchange programme (IDISR); and

➢ Dangerous goods coordinated oversight programme (VCMP) (SRVSOP members).

3.1.3.2　　For States that are not members of the SRVSOP

✓ Air operator certificate registry (AOC)

3.2　　Improvement of effective implementation (EI) by audit area

3.2.1　　ANS

✓ Short term (January 2014 - December 2017):

➢ LAR ANS development.

➢ LAR ANS orientation material development.

➢ ANS regulations harmonization among SAM States.

➢ ANS requirements and procedures effective implementation.

➢ ANS providers SMS implementation.

3.2.1　　AGA (Please refer to WP/05)

3.3　　Effective implementation (EI) improvement by critical element

3.3.1　　CE- 4 – Technical personnel qualification and training

✓ Short term (January 2014 - December 2016):

➢ Standardization of SAM States inspectors' instruction programmes.

➢ SRVSOP support through training courses for States that request it.

✓ Medium term (January 2017- December 2019):

➢ Development and effective implementation of a multinational training system through ICAO South American Regional Office and SRVSOP web pages.

Appendix B

Accidents

1. **Safety performance indicators**

1.1 Safety objectives established by ICAO for period 2008-2011 in 2007 GASP edition were the following:

	Objectives 2008-2011
First objective	Reduce the number of fatal accidents and the global mortality rate caused by these accidents, independently from air traffic volume.
Second objective	Achieve a significant reduction of accidents rates, particularly in the regions where these continue to be high.
Third objective	None of the ICAO regions should have an accident rate above the double global rate for the end of 2011.

* Based in a five year mobile rate

1.2 In the below charts it can be noticed that the SAM Region, since year 2005, start to reduce gradually accidents, except in year 2008, when this rate increased abruptly. According to the Third objective of the 2007 GASP, the accidents rate for the end of 2012, although it was above the global rate, it did not double this rate.

Table B-1a – Number and rate of accidents in the SAM Region

Year	Non-fatal accidents	Fatal accidents	Total accidents	Departures	SAM Rate	Global Rate	Mortality
2005	8	2	10	1,156,272	8.64	4.36	53
2006	6	4	10	1,195,107	8.36	4.07	166
2007	6	2	8	1,289,860	6.20	4.22	202
2008	12	7	19	1,369,691	13.87	4.78	94
2009	11	0	11	1,507,869	7.29	4.05	0
2010	7	4	11	1,777,672	6.18	4.16	29
2011	9	3	12	1,918,423	6.25	4.19	46
2012	9	1	10	1,953,982	5.11	3.15	2
Total	**68**	**23**	**91**	**12,168,876**	**7.74**	**4.12**	**592**

Table B-1b – SAM Region accidents rate projection
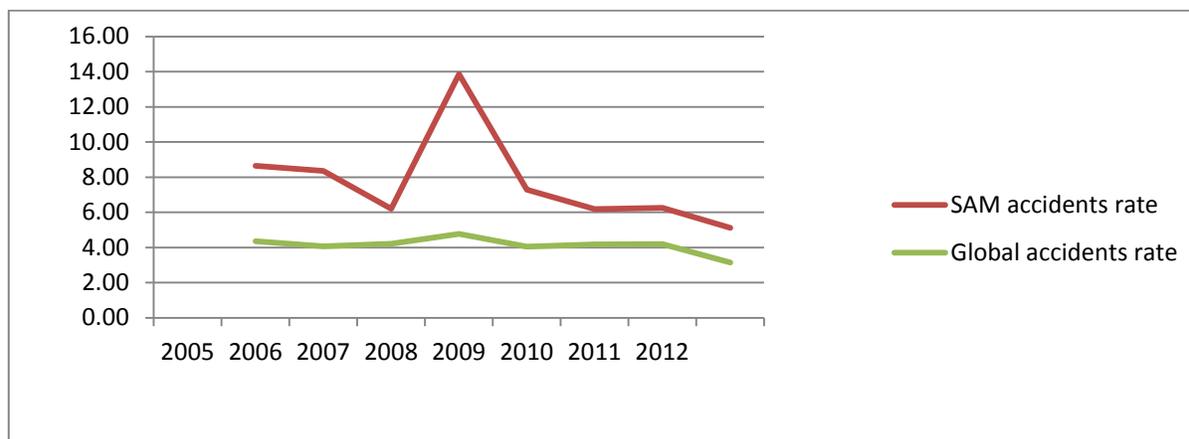
1.3   **Method for calculating safety performance targets.**

1.3.1   **Method based in a retrospective risk analysis process using safety enhancements**

1.3.1.1   This method is based in a retrospective risk analysis process that evaluates effectiveness of proposed enhancement for each event or selected condition. This is achieved through the evaluation of the opportunity that the enhancement could have had to prevent the events if this would have been hypothetically applied before the event was produced.

1.3.1.2   In this regard, the Commercial Aviation Safety Team (CAST), a United States government aviation industry association, dedicated to reduce commercial aviation mortality rate in its country, carried out a risk analysis of accidents occurred in the SAM Region during period 2002-2012 *(Refer to Attachment I of this Appendix)*, in which the following nine (09) safety enhancements (SE) of the Regional Aviation Safety Group-Pan-American (RASG-PA) were applied: *RE/04, RE/09, CFIT/02, CFIT/04, LOC-I/06, LOC-I/07, LOC-I/9, RE/8 and RE/11 (Refer to RASG-PA safety enhancements presented as Attachment II of this Appendix).*

1.3.1.3   Through this analysis and the application of weighting factors to risks and events severity, CAST determined that **18.9%** of the total accidents occurred in the SAM Region during the period 2002-2012 could have been avoided.

1.3.1.4   Using 18.9%, it is possible to determine the number of accidents that could have been avoided during the period 2002 – 2012 in the event that the 9 SE would have been applied. For this, 20% (18.9%) is applied to the average of 10 (10.7) accidents occurred in the last 11 years (2002-2012), reaching a result of 2 accidents less.

1.3.1.5   In the event that all the SAM States would apply uniformly the 9 SE, a decrease of 2 accidents could be foreseen out of the actual accident average of 10, resulting in 8 accidents for the period 2014-2018. Regarding the number of departures, for year 2016 (intermediate year of the period 2014-2018), 2,150.000 departures could be estimated in scheduled operations based on an annual growth of 3.1%. With these data an annual accident rate of **3.72** is obtained for every million departures [8 x 1,000.000 ÷ 2,150.000 = 3.72] which will be the performance target proposed up to year 2018.

2.   **Proposals of safety performance targets**

2.1   In period 2014-2018, the target will not be higher to the following rate:

   ✓ **3.72** accidents per million departures

3.   **SAM Region accidents breakdown**

3.1   **Accidents per risk category**

3.1.1   A total of **91** accidents occurred in the SAM Region during period 2005-2012 of which **49.45%** was due to accidents related to runway safety (RS); **13.18%** for system/component failure or malfunction (SCF); **12.08%** for other causes (OTH); **6.59%** for each one of the following categories: turbulence encounter (TURB), Loss of control in-flight (LOC-I) and by unknown or undetermined cause (UNK); **5.49%** for controlled flight into terrain (CFIT) and 0% for fire/smoke (without impact) (F-NI). RS category groups accidents by: aerodrome, bird impact, runway incursions, runway excursions, abnormal runway contact and ground collision.

Table B-2a – Accidents by risk category

Year	F-NI	TURB	LOC-I	RS	OTH	CFIT	UNK	SCF	Total
2005	0	0	0	6	2	1	0	1	10
2006	0	0	0	4	2	2	0	2	10
2007	0	1	0	4	2	0	1	0	8
2008	0	0	3	9	1	2	1	3	19
2009	0	3	0	6	2	0	0	0	11
2010	0	0	1	7	0	0	2	1	11
2011	0	0	2	7	0	0	1	2	12
2012	0	2	0	2	2	0	1	3	10
Total	**0**	**6**	**6**	**45**	**11**	**5**	**6**	**12**	**91**
%	**0**	**6.59**	**6.59**	**49.45**	**12.08**	**5.49**	**6.59**	**13.18**	

3.2   **Accidents per flight phase**

3.2.1   By flight phase, accidents were produced according to the following order: landing **45.97%**, en-route **18.39%**, approach **16.09%**, during departure **12.64%**, running **5.74%** and parked aircraft **1.14%**.

Table B-2b – Accidents per flight phase

Year	Post imp.	UNK	Manoeu.	Stand	taxi	En route	Apch	Take off	Land.	Total
2005	0	0	0	0	0	0	1	4	4	9
2006	0	0	0	1	0	4	2	0	2	9
2007	0	0	0	0	0	2	0	2	4	8
2008	0	0	0	0	4	4	5	2	4	19
2009	0	0	0	0	1	2	3	0	4	10
2010	0	0	0	0	0	0	2	0	9	11
2011	0	0	0	0	0	1	1	1	9	12
2012	0	0	0	0	0	3	0	2	4	9
Total	**0**	**0**	**0**	**1**	**5**	**16**	**14**	**11**	**40**	**87**
%	**0**	**0**	**0**	**1.14**	**5.74**	**18.39**	**16.09**	**12.64**	**45.97**	

4.   Principal categories of fatal accidents in the SAM Region

4.1   The following are the three main categories of fatal accidents during period 2002-2011:

  ✓ loss of control in-flight (LOC-I);

  ✓ runway excursions (RE); and

  ✓ controlled flight into terrain (CFIT).

4.2   Loss of control in-flight (LOC-I)

4.2.1   The tables below show that in the SAM Region, 4 accidents occurred due to loss of control in-flight in a period of 8 year (2005-2012) and that there is no linear projection but rather are isolated accidents. Although these accidents are rare, these produce the highest mortality.

Table B-3a – Number and accident rate by LOC-I

Loss of control in-flight (LOC-I) – Accidents rate in the SAM Region			
Year	Total Accidents	SAM Departures	SAM Accidents Rate
2005		1,156,272	0.00
2006		1,195,107	0.00
2007		1,289,860	0.00
2008	3	1,369,691	2.19
2009		1,507,869	0.00
2010	1	1,777,672	0.56
2011	2	1,918,423	1.04
2012		1,953,982	0.00

Table B-3b – Accidents rate projection by LOC-I
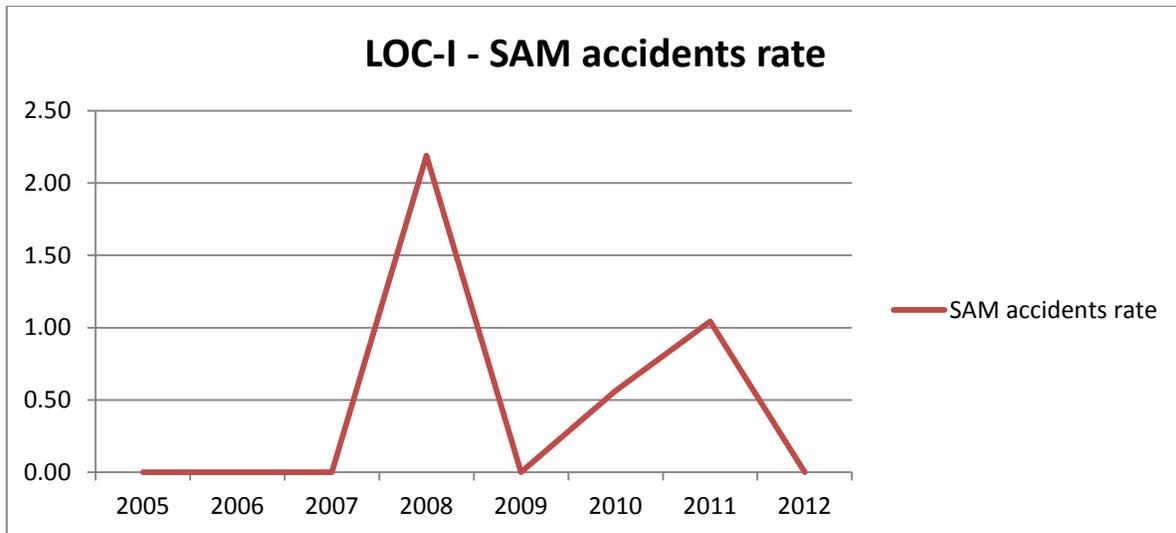
4.3   **Runway excursions (RE)** (Refer to Appendix C of this working paper)

4.4   **Controlled flight into terrain (CFIT)**

4.4.1   In the following charts we can observe that in the SAM Region, 5 accidents occurred due to CFIT between 2005 and 2008, however, on year 2009 up to 2012, no accidents under this category has occurred, reason why at present moment this does not constitute a safety threat, although it is recommended to continue implementing safety enhancements to avoid accidents due to this cause.

Table B-4a – Number and rate of accidents by CFIT

Controlled flight into terrain (CFIT)			
Accidents rate in the SAM Region			
Year	Total accidents	SAM Departures	SAM Accidents Rate
2005	1	1,156,272	0.86
2006	2	1,195,107	1.67
2007	0	1,289,860	0.00
2008	2	1,369,691	1.46
2009	0	1,507,869	0.00
2010	0	1,777,672	0.00
2011	0	1,918,423	0.00
2012	0	1,953,982	0.00

Table B-4b – Projection of accidents rate by CFIT

CFIT - SAM accidents rate
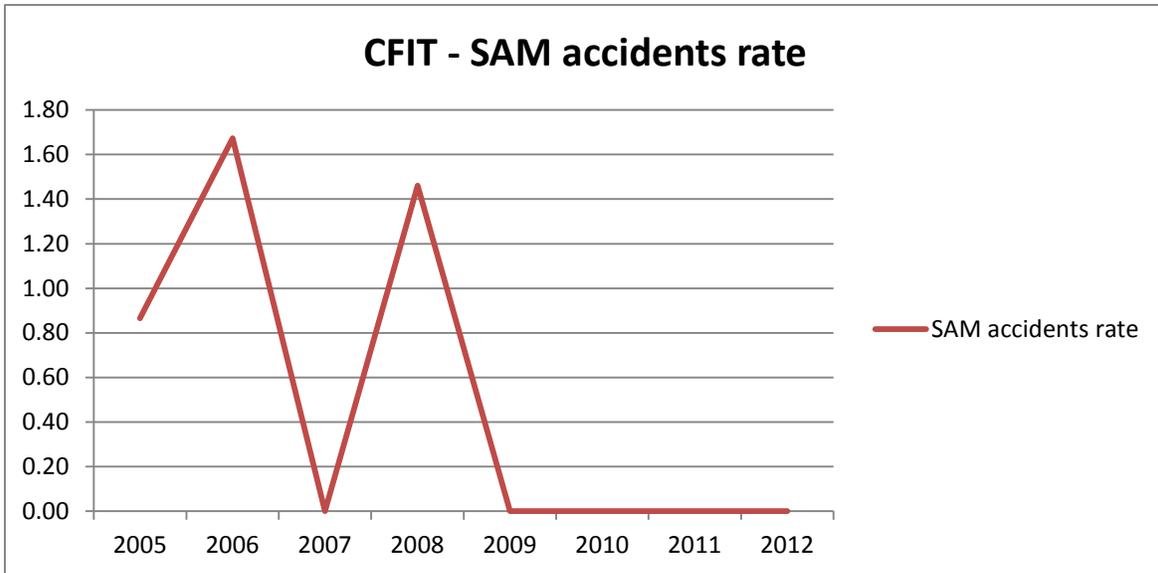
5.   Proposals for safety enhancement

5.1   The following safety enhancements are proposed for the three categories of fatal accidents: loss of control in-flight (LOC-I); runway excursions (RE); and controlled flight into terrain (CFIT):

5.1.1   **Loss of control in-flight (LOC-I)**

    ✓ Short term (January 2014 - December 2016):

        ➢ Effective implementation in all SAM States of requirements related to upset prevention and recovery training of the aircraft (UPRT). These requirements will permit mitigating occurrences related to the loss of control of the aircraft. It is foreseen that the amendments to Annex 1, Annex 6, Part I, and PANS-TRG be applied starting 13 November 2014. It is also foreseen that UPRT requirements of Latin American Aeronautical Regulations (LAR) be applied from the same date.

        ➢ Effective implementation of reactive and proactive systems for data collection, hazard identification and risk management related to LOC-I.

        ➢ Effective implementation of the advanced qualification programme (AQP) or ICAO evidence based training (EBT) (loss of control in-flight scenarios).

    ✓ Medium term (January 2017- December 2019):

        ➢ Effective implementation of the predictive data collection system, hazard identification and risk management related to LOC-I.

    ✓ Long term (January 2020 – December 2022)

        ➢ Implementation of a supervision advanced system that includes reactive, proactive and predictive systems oriented to LOC-I.

5.1.2   **Runway excursions (RE).-** Performance indicators and targets for this category of fatal accidents, as well as safety enhancements are detailed in Appendix C to this WP.

5.1.3   **Controlled flight into terrain (CFIT)**

    ✓ Short term (January 2014 - December 2016):

        ➢ Continue with the effective implementation in all the SAM States of CFIT training support that contains the ALAR tool kit of the Flight Safety Foundation (FSF).

        ➢ Effective implementation of data collection reactive and proactive systems, hazard identification and risk management related to CFIT.

        ➢ Effective implementation of the advanced qualification programme (AQP) or ICAO evidence based training (EBT) (scenarios CFIT).

    ✓ Medium term (January 2017- December 2019):

        ➢ Effective implementation of data collection predictive systems, hazard identification and risk management related to CFIT.

    ✓ Long term (January 2020 – December 2022)

        ➢ Implementation of a supervision advanced system that includes reactive, proactive and predictive systems oriented to CFIT.

5.2   **RASG-PA safety enhancements**

5.2.1   The RASG-PA safety enhancements are included in Attachment 2 to this Appendix.

6.   Other categories to be taken into account for planning safety targets and enhancements

6.1   According to *Table B-2a – Accidents by risk category*, the following categories should be given attention when planning aviation safety. These present a rate equal or higher than those of categories LOC-I and CFIT:

- ✓ system/component failure or malfunction (SCF) (13.18%);

- ✓ other causes (OTH) (12.08%);

- ✓ turbulence encounter (TURB) (6.59%); and

- ✓ unknown or undetermined (UNK) (6.59%).

CAST Spreadsheet Tool Panamanian and South American Operator Accidents

RASG-PA Safety Enhancements
RE/04, RE/09, CFIT/02, CFIT/04, LOC-I/06, LOC-I/07, LOC-I/9, RE/8, RE/11

Accident Set Used For Evaluation
2002-2012 Hull Loss and Fatal Accidents (46) - (Panamanian and South American Domicile Operators With Operations Similar to Part 121)

Notes:
Preliminary Assessment (SE Effectiveness Values) performed by FAA AVP-200;

A Preliminary SE Implementation Value of 50% was used for all 9 SEs
(Portion of Fleet or Risk Population with SE Implemented)

Date	Airplane	Jet/Turbo Prop	Airline	Location	Portion of Event Eliminated	Safety Enhancement								
						RE/04	RE/09	CFIT/02	CFIT/04	LOC-I/06	LOC-I/07	LOC-I/9	RE/8	RE/11
						Implementation Value						Implementation Value		
						.500	.500	.500	.500	.500	.500	.500	.500	.500
						Safety Enhancement Effectiveness (%/100)				Safety Enhancement Effectiveness (%/100)				
1/28/2002	B727-100	Jet	TAME	(near) Ipiales	.420	.150	.100	.375	.150	.050	.000	.200	.000	.000
3/18/2002	B727	Jet	VARIG	Belo Horizonte, BR	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
6/14/2002	DC-9	Jet	Inter (Colombia)	Neiva, CO	.487	.300	.300	.000	.200	.250	.150	.050	.000	.000
8/30/2002	Fokker 100	Jet	TAM Linhas Aereas	Birigui, BR	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
8/30/2002	EMB-120 Brasilia	TP-Small	RICO Linhas Aereas	(near) Rio Branco,	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
9/14/2002	ATR 42	TP-Large	Total Linhas Aereas	(near) Paranapane	.220	.050	.000	.000	.000	.000	.400	.000	.000	.000
1/9/2003	Fokker F.28	Jet	TANS	(near) Chachapoya	.462	.300	.100	.150	.400	.000	.000	.200	.000	.000
1/26/2003	B737 (JT8D)	Jet	VASP	Rio Branco, BR	.306	.000	.050	.150	.000	.200	.200	.100	.000	.000
10/20/2003	Fokker F.27	TP-Large	TAVAJ	Tarauaca, BR	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
10/26/2003	Fairchild FH-227	TP-Large	CATA Linea Aerea SA	(near) Buenos Aire	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
12/13/2003	B737 (JT8D)	Jet	Nuevo Continente	Lima, PE	.522	.500	.300	.000	.000	.000	.000	.500	.000	.000
12/18/2003	DC-9	Jet	Lineas Aereas Suram	(near) Mitu, CO	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
5/14/2004	EMB-120	TP-Small	RICO Linhas Aereas	(near) Manaus, BR	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
10/23/2004	B707	Jet	Beta Cargo	Manaus, BR	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
11/18/2004	Jetstream 31	TP-Small	Venezolana	Caracas, VE	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1/8/2005	MD-80	Jet	AeroRepublica Colomb	Cali, CO	.469	.500	.200	.000	.300	.100	.000	.050	.000	.000
2/22/2005	Convair 580	TP-Large	TAM - Transporte Aer	Trinidad, BO	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
4/7/2005	Fokker F.28	Jet	ICARO Air	Coca, EC	.213	.300	.000	.000	.000	.000	.000	.050	.100	.000
8/16/2005	MD-80	Jet	West Caribbean Airw a	(near) Machiques,	.536	.000	.000	.000	.050	.300	.600	.400	.000	.000
8/23/2005	B737 (JT8D)	Jet	TANS	(near) Pucallpa, PE	.563	.500	.100	.150	.400	.000	.300	.050	.000	.000
4/16/2006	Fokker F.27	TP-Large	TAM - Transporte Aer	Guayaramerin, BO	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
6/1/2006	Jetstream 31	TP-Small	Air Panama	Bocas de Toro, PA	.166	.200	.000	.000	.000	.000	.000	.050	.100	.000
8/17/2006	B727	Jet	Aerosucre Colombia	Bogota, CO	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
9/29/2006	B737 (NG)	Jet	GOL Linhas Aereas	(near) Peixote Aze	.145	.000	.000	.000	.100	.000	.000	.200	.000	.000
11/17/2006	DC-10	Jet	Cielos Airlines	Barranquilla, CO	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
11/18/2006	B727	Jet	Aerosucre Colombia	(near) Leticia, CO	.541	.400	.100	.150	.550	.000	.000	.200	.000	.000
2/4/2007	DC-8-71F	Jet	Tampa Cargo	MIAMI	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
7/17/2007	Airbus A320	Jet	TAM Linhas Aereas	Sao Paulo, BR	.248	.200	.000	.000	.100	.100	.000	.050	.100	.000
7/17/2007	EMB 190	Jet	AeroRepublica Colomb	Santa Marta, CO	.707	.500	.125	.150	.400	.500	.000	.500	.000	.000
10/31/2007	Fokker F.27	TP-Large	Air Panama	Panama City, PA	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1/28/2008	Dash 8-200	TP-Large	Aires Colombia	Bogota, CO	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2/1/2008	B727-200	Jet	LAB	Near Trinidad	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2/21/2008	ATR-42-300	TP-Large	Santa Barbara Airlines	(near) Merida, VE	.575	.050	.000	.400	.500	.200	.300	.100	.000	.000
7/23/2008	F.27-400	TP-Large	TAM - Transporte Aer	70nm from Guayar	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
9/22/2008	F-28-4000	Jet	ICARO	QUITO	.231	.200	.000	.000	.200	.000	.000	.000	.100	.000
10/16/2008	B737-200	Jet	Rutaca	CARACAS	.188	.200	.000	.000	.100	.000	.000	.000	.100	.000
5/17/2009	DHC-6-300	TP-Small	Aeroperlas	Carti, PA	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
5/5/2010	ERJ-145LR	Jet	SATENA	Mitu-Fabio, Colombi	.373	.500	.100	.000	.100	.100	.000	.050	.000	.000
8/16/2010	B737-73V (WL)	Jet	AIRES Colombia	San Andres, Colom	.375	.500	.100	.000	.200	.000	.000	.050	.000	.000
9/13/2010	ATR-42-320	TP-Large	Conviasa	Puerto Ordaz, Vene	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1/25/2010	Embraer 110C Ban	TP-Small	Piquiatuba Táxi Aéreo	near Senador José	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
5/18/2011	SF34A (26)	TP-Large	SOL Líneas Aéreas	Prahuaniyeu, Arger	.123	.000	.000	.000	.200	.000	.050	.000	.000	.000
9/6/2011	SA-227BC Metro III	TP-Small	Aerocon	Trinidad, Bolivia	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
9/16/2011	EMB 190(5)	Jet	TAME	Quito,Ecuador	.390	.500	.100	.150	.000	.000	.000	.050	.100	.000
9/26/2011	DC-9(35)	Jet	Aeropostal	Puerto Ordaz,Vene	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
8/24/2012	Boeing (McDonnell-	Jet	Aserca Airlines	Mayor Buenaventu	.451	.500	.100	.150	.200	.100	.000	.050	.000	.000

	1	2	3	4	5	6	7	8	9
	Safety Enhancement								
	RE/04	RE/09	CFIT/02	CFIT/04	LOC-I/06	LOC-I/07	LOC-I/9	RE/8	RE/11
	Implementation Value								
	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Category Definition	Number of Events by Category	Sum total of severity by category	% Severity by category	% Events by category	% of Category Severity Eliminated	Total Events Eliminated by Category	Total Severity Eliminated by Category	% Total Fatality Risk Eliminated	% Total Events Eliminated	Severity eliminated by SE								
										1	2	3	4	5	6	7	8	9
CFIT	8.00	6.06	42.1%	17.4%	36.8%	2.87	2.23	15.5%	6.2%	0.55	0.17	0.57	0.88	0.13	0.21	0.36	0.00	0.00
LOC-I	6.00	5.33	37.1%	13.0%	16.5%	0.88	0.88	6.1%	1.9%	0.00	0.03	0.00	0.13	0.15	0.53	0.20	0.00	0.00
RE-Landin	13.00	1.22	8.5%	28.3%	20.3%	3.01	0.25	1.7%	6.5%	0.10	0.00	0.00	0.05	0.05	0.00	0.03	0.05	0.00
SCF-PP	2.00	0.03	0.2%	4.3%	0.0%	0.00	0.00	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SCF-NP	5.00	0.00	0.0%	10.9%		0.00	0.00	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Midair	1.00	1.00	7.0%	2.2%	14.5%	0.15	0.15	1.0%	0.3%	0.00	0.00	0.00	0.05	0.00	0.00	0.10	0.00	0.00
FUEL	2.00	0.00	0.0%	4.3%		0.00	0.00	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RE-Takeof	2.00	0.00	0.0%	4.3%		0.23	0.00	0.0%	0.5%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UNK	1.00	0.52	3.6%	2.2%	0.0%	0.00	0.00	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WSTRW	0.00	0.00	0.0%	0.0%		0.00	0.00	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
USOS	3.00	0.22	1.5%	6.5%	2.7%	0.59	0.01	0.0%	1.3%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ADRM	0.00	0.00	0.0%	0.0%		0.00	0.00	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ARC	3.00	0.00	0.0%	6.5%		0.99	0.00	0.0%	2.2%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FIRE-NI	0.00	0.00	0.0%	0.0%		0.00	0.00	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ramp	0.00	0.00	0.0%	0.0%		0.00	0.00	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.0%	0.0%		0.00	0.00	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	46	14.39				8.7	3.5	24.4%	18.9%	.7	.2	.6	1.1	.3	.7	.7	.1	.0
	Events	Total Severity																

Color Coding

	Data Entry Field
	Linked Field
	Calculation/Output Field
	Calculation/Output Field
	Summary Output

JIMDAT Score (Percentage of Risk and Accidents Eliminated by SE Acting on its Own)

		1	2	3	4	5	6	7	8	9
		RE/04	RE/09	CFIT/02	CFIT/04	LOC-I/06	LOC-I/07	LOC-I/9	RE/8	RE/11
% Fatality Risk Eliminated	24.4%	4.6%	1.4%	3.9%	7.7%	2.3%	5.1%	4.8%	0.3%	0.0%
% Total Event Eliminated	18.9%	6.8%	2.0%	2.0%	4.5%	2.1%	2.2%	3.2%	0.7%	0.0%

Portion of Fatality Risk Mitigated by Proposed Safety Enhancements
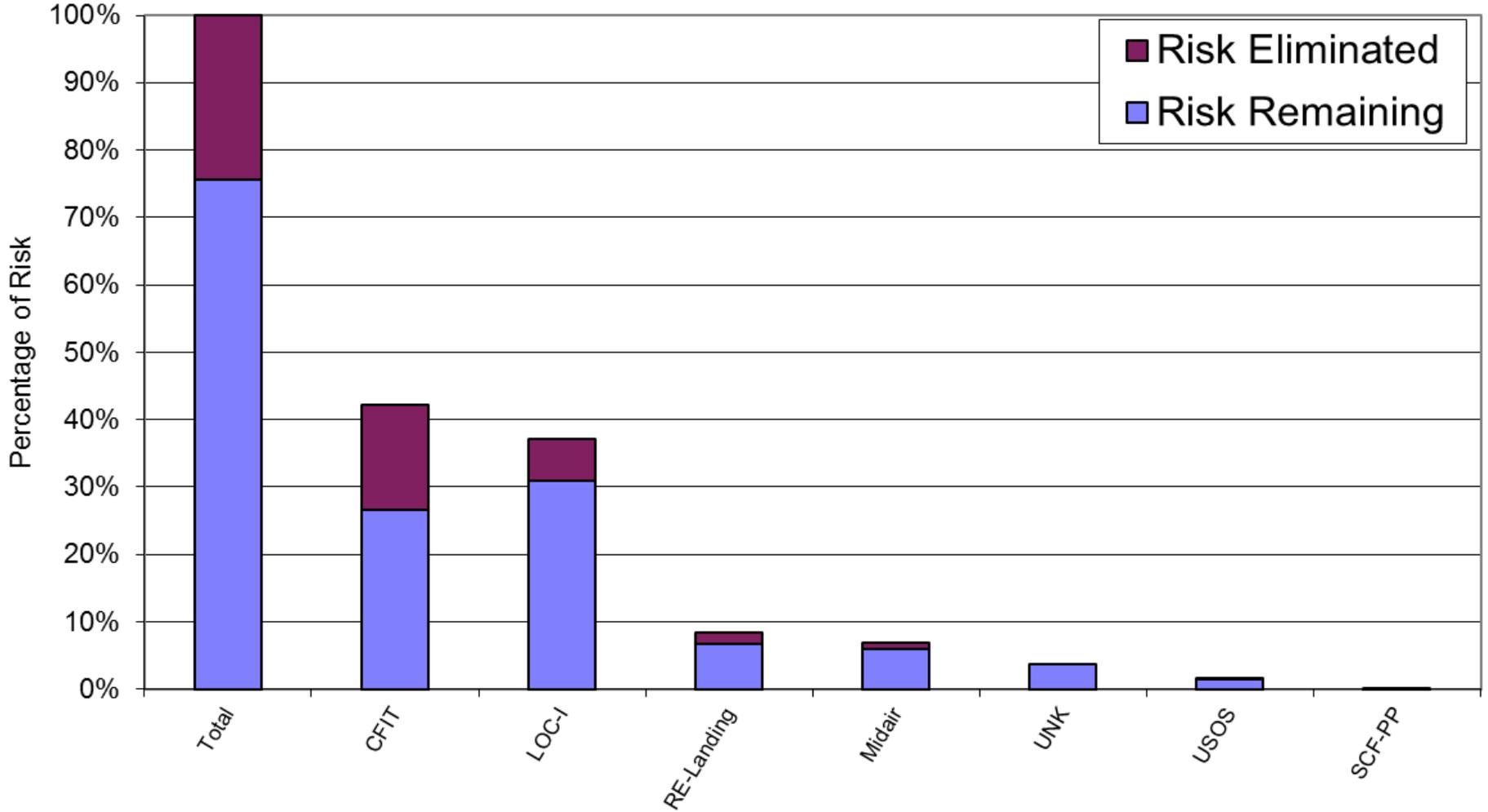
Portion of Accidents Mitigated by Proposed Safety Enhancements
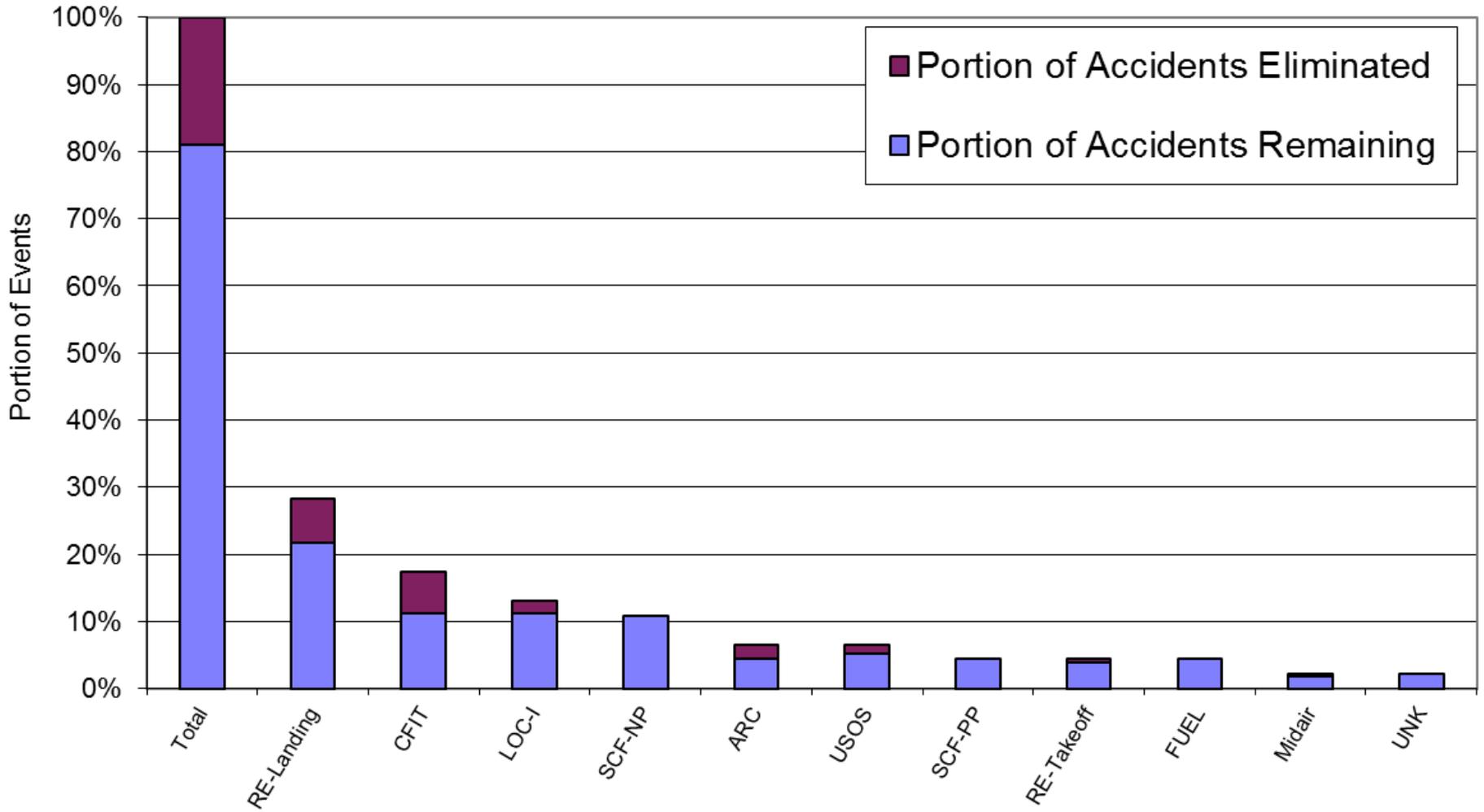
Assumes Each Safety Enhancement is Acting on Its Own

Percentage of the Fatality Risk Eliminated by the Proposed Enhancements
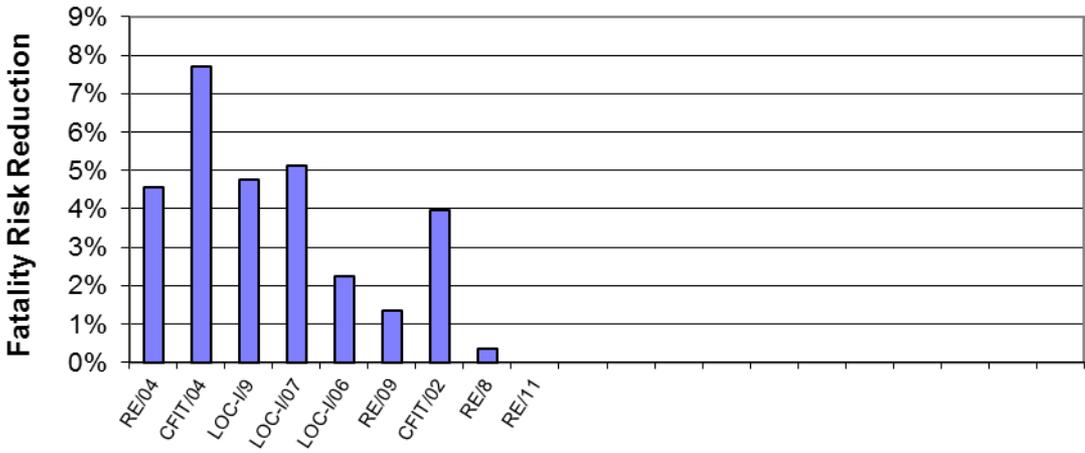
Percentage of the Accidents Eliminated by the ProposedEnhancements
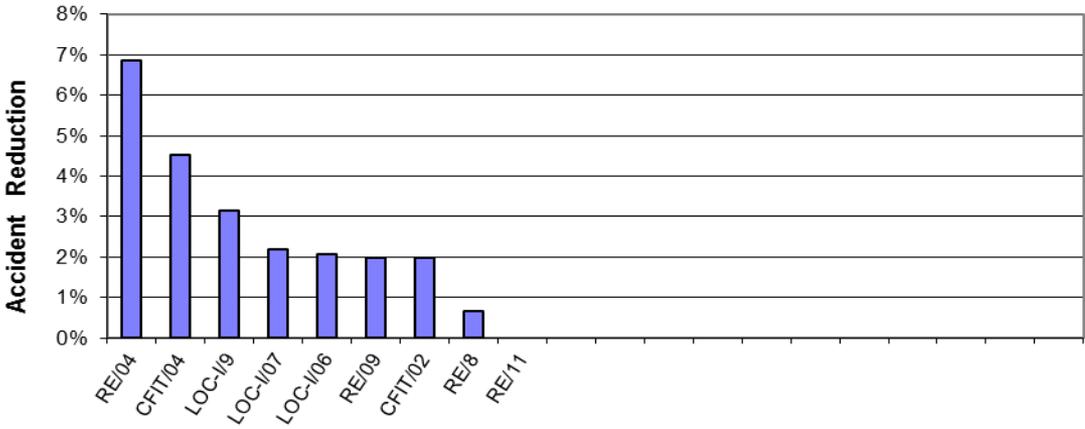
Unmitigated Fatality Risk From High to Low

Category	Date	Airplane	Jet/Turbo Prop	Airline	Location	Remaining Severi
LOC-I	10/26/2003	Fairchild FH-227	TP-Large	CATA Linea Aerea SA	(near) Buenos Aires, AR	1.000
LOC-I	12/18/2003	DC-9	Jet	Lineas Aereas Surame	(near) Mitu, CO	1.000
CFIT	9/6/2011	SA-227BC Metro I	TP-Small	Aerocon	Trinidad, Bolivia	0.889
LOC-I	5/18/2011	SF34A (26)	TP-Large	SOL Líneas Aéreas	Prahuaniyeu, Argentina	0.878
MIDAIR	9/29/2006	B737 (NG)	Jet	GOL Linhas Aereas	(near) Peixote Azevedo, BR	0.855
LOC-I	9/14/2002	ATR 42	TP-Large	Total Linhas Aereas	(near) Paranapanema, BR	0.780
CFIT	8/30/2002	EMB-120 Brasilia	TP-Small	RICO Linhas Aereas	(near) Rio Branco, BR	0.767
RE-Landin	7/17/2007	Airbus A320	Jet	TAM Linhas Aereas	Sao Paulo, BR	0.752
CFIT	1/28/2002	B727-100	Jet	TAME	(near) Ipiales	0.580
CFIT	1/9/2003	Fokker F.28	Jet	TANS	(near) Chachapoyas, PE	0.538
UNK	5/14/2004	EMB-120	TP-Small	RICO Linhas Aereas	(near) Manaus, BR	0.524
LOC-I	8/16/2005	MD-80	Jet	West Caribbean Airway	(near) Machiques, VE	0.464
CFIT	11/18/2006	B727	Jet	Aerosucre Colombia	(near) Leticia, CO	0.459
CFIT	2/21/2008	ATR-42-300	TP-Large	Santa Barbara Airlines	(near) Merida, VE	0.425
LOC-I	9/13/2010	ATR-42-320	TP-Large	Conviasa	Puerto Ordaz, Venezuela	0.333
USOS	1/25/2010	Embraer 110C Ba	TP-Small	Piquiatuba Táxi Aéreo	near Senador José Porfirio, Bra	0.200
RE-Landin	11/18/2004	Jetstream 31	TP-Small	Venezolana	Caracas, VE	0.190
CFIT	8/23/2005	B737 (JT8D)	Jet	TANS	(near) Pucallpa, PE	0.178
RE-Landin	4/16/2006	Fokker F.27	TP-Large	TAM - Transporte Aere	Guayaramerin, BO	0.032
SCF-PP	7/23/2008	F.27-400	TP-Large	TAM - Transporte Aere	70nm from Guayaramerin, BO	0.028
USOS	8/16/2010	B737-73V (WL)	Jet	AIRES Colombia	San Andres, Colombia	0.010

ATTACHMENT 2 TO APPENDIX B / ADJUNTO 2 AL APENDICE B

	A	B	C	D	E	F	G	H
1					**DETAILED IMPLEMENTATION PLANS (DIPs) by PA-RAST/11**			
2	#	DIP	Description	Champion	Output	Deadline	Status	Comments
3	1	RE/04	Promote pilot adherence to Standard Operating Procedures (SOPs) for approach procedures including go-around decision making process	ALTA	1) Distribution	18/01/11	Completed	
4					2) Training		Completed	
5,6	2	RE/09	Specific Training for pilots and air traffic controllers to avoid unstabilized approaches	ALTA	1) ALTA will conduct a survey within its operators regarding the actions taken to mitigate unstable approaches.	20/02/11	Completed	
7,8					2) Develop a strategy to deliver safety seminars for pilots and controllers in Pan America that targets recognition and avoidance of unstable approaches.	31/12/12	In process	Updated: 5 December 2012. ALTA, IFALPA, IFATCA currently working on the script and working on video budget funding.
9	3	CFIT/02	Specific ALAR/CFIT Training for Pilots	IATA	1) CAA conducts a review of all operators to ascertain which operators have CFIT prevention training and procedures in their approval training	20/02/11	Completed	
10					2) If an operator does not have a CFIT training, it will be encourage to incorporate CFIT training into the airline training program.	20/12/11	Completed	
11,12	4	CFIT/04	CRM/Situational Awareness for pilots and air traffic controllers	IFALPA & IFATCA	1) Incorporate and/or update CRM/situational awareness training programs for all flight crew members of air transport operators emphasizing aircraft position with relation to terrain and reviewing past ocurrences.	20/02/12	In process	IFALPA is coordinating with IATA and IFATCA the development of a video for pilots and air traffic controllers regarding Crew Resource Management (CRM).
13,14					2) Incorporate CRM/situational awareness training programs for all air traffic controllers and air navigation service providers (ANSP) emphasinzing aircraft position with relation to minimum allowable	20/08/12	In process	
15,16	5	LOC-I/06	LOC Training – Human factors and automation	PA-RAST	1) Review and evaluate the advisory circular created by the ICAO COSCAP's in Asia	20/02/11	Completed	
17					2) ICAO will distribute a copy of the developed generic advisory circular to each State in the region.	20/03/11	Completed	
18,19					3) Each State in the region wil use the generic advisory circular as a template to prepare a State Advisory Circular on mode awareness and energy state management aspects of flight deck automation.	20/09/11	Completed	
20					4) Mode awareness and energy state management aspects of flight deck automation guidance is provided by operators to all their pilots.	20/09/12	Completed	
21	6	LOC-I/07	LOC Training – Advanced maneuvers	ALTA	1) Listing of training materials available from regulators, industry, operators, academia and other resources.	18/01/11	Completed	
22					2) Advanced Maneuvers Training provided to all operators.	18/04/11	Completed	
24,25					3) Advanced Maneuvers Training provided by all operators. The expectation is that this training will be accomplish during initial training and as part of the recurrent training program via ground and simulator instruction within the certified flight envelope, with enphasis on recognition, prevention and recovery technique.	18/08/13	Superseded	

ATTACHMENT 2 TO APPENDIX B / ADJUNTO 2 AL APENDICE B

	A	B	C	D	E	F	G	H
26	7	LOC-I/9	Loc Training - Pilot monitoring policies and procedure for the operator and training program for crews	IFALPA	1) Listing of training materials available from industry, operators and other resources.	20/02/11	Completed	
27					2) Raise awareness of availability and need of Pilot Monitoring Training.	20/03/11	Completed	
28					3) Pilot Monitoring Training material provided to all operators.	20/03/11	Completed	
29					4) Pilot Monitoring Training provided by operators to all their pilots.	20/09/12	Completed	
30	8	RE/8	Guidance in maintaining runway in accordance with Annex 14	ACI-LAC	1) Create a guide that collects best practices for runway maintenance	18/04/12	Completed	
32					2) Promote and encourage the use of the guide		In process	ESC requested ACI-LAC to provide enhanced Manual for approval and dissemination.
33 34					3) Airports implement their maintenance plans according to the runway maintenance guide.		In process	
35 36 37	9	RE/11	Develop guidance material and training programs to create action plans for runway safety teams	DGAC Mexico	1) Gather and publish in the RASG-PA website available material that may be used in to mitigate hazards related to runway safety.		Completed	
38					2) Electronic checklist development.		In process	Updated: 6 December 2012. Mexico DGAC is developing the Toolkit to be presented to the PA-RAST for approval. Considering that the electronic checklist will be part of the Toolkit they requested that Output 2 be removed from the DIP.
39 40					3) Establishment of a regional Runway Safety Database.	25/02/12	In process	Updated: 6 December 2012. Mexico DGAC considered that the Output 3 would not be feasible and request to be removed from the DIP. To be reviewed with the Champion
41					4) Develop a roll out plan.	25/08/12	In process	Updated: 6 December 2012. Mexico DGAC considered that the Output 4 must be coordinated with PA-RAST due to the need of resurces for delivering the workshops.
42					X) Launch of the RST Toolkit			Updated: 6 December 2012. Mexico DGAC suggested to include the new Output X for launching the Toolkit
43					5) Review and update of the Runway Safety Teams.		In process	Updated: 6 December 2012. Mexico DGAC considered that the Output 5 is monitored by the ICAO NACC and SAM and RASG-PA, and the material is updated by ICAO HQ. Therefore, they requested to be removed from the DIP.

GSI #	Description	Champion	Output	Deadline	Status	Comments
3	Protection of Safety Information	COCESNA				
12	Sharing of Information Safety Data	RASG-PA	ASIAS/RASG-PA data sharing			
		IATA/ALTA	IATA/ALTA Trend Sharing Program			
		DGAC CR	PASO			
		ANAC	BRAZIL			
4	Accident/Incident Regional Board	COCESNA				
	Business case for thechnology to mitigate runway excursions	ICAO LIM				
	Spanish Standard Phraseology	ALTA				Using PANS-ATM (DOC 4444) Chapter 12
	Bird Strike Risk Reduction Program	IATA/ALTA	PTY	Aug-13	To start Jun 2012	Biologist apointed, gathering pre-assessment requierements
			GYE	Aug-13	To start Jun 2012	

ESC Approved Detailed Implementation Plans (DIPs)

Rast No	Safety Enhancement Action	Reference	GSI	Safety Impact	Changeability	Indicator	Priority	Time Frame
RAST-PA/RE/04	Promote pilot adherence to Standard Operating Procedures (SOPs) for approach procedures including go- around decision making process.		9	High	Easy	P1	1	Short

Safety Enhancement Action (expanded):	Promoting pilot adherence to Standard Operating Procedures (SOPs) which would include stabilized approach criteria and go/no go take-off decision making procedures is key to preventing and reducing the risk of runway excursions. Reviewing existing operational policies, procedures and programs is also part of an overall strategy in mitigating runway excursion risk.
Statement of Work:	Runway Excursion has been identified as the highest safety risk area in Pan America. In order to proactively reduce this risk, RASG-PA chartered the Regional Aviation Safety Team (RAST) to review runway excursion information and develop mitigation strategies to reduce this risk.
Champion Organization:	ALTA
Human Resource:	ICAO (NACC, SAM, HQ), IATA, ALTA, ACSA, FSF, CANSO, aircraft manufacturers, ALPA, IFALPA, IFATCA, CAA's, and other stakeholders.
Financial Resource:	10000
Relation Current Aviation Community Initiative:	IATA Runway Excursion Risk Reduction toolkit/FSF: ALAR toolkit (version June 2010) Colegio de Pilotos Aviadores de México: Aeronautical Decision Management Training
Performance Goal Indicators:	Goal 1: target audience(s): Latin America and Caribbean, will value the information provided (1) Objective: educate the target audience(s) (2) Indicator: to reach 80% of the airlines pilots in the Region (3) Indicator: to reach 80% of other stakeholders as determined by the research. Goal 2: increase the awareness on runway excursions (1) Objective: reduce the number of events (2) Indicator: reduction of 80% of the events in the region
Key Milestones:	• Authorization by IATA to upload copyright material from RERR Toolkit in RASG-PA website: pending • Release of State letters from RASG-PA Secretariat recommending establishment of SOPs: SCA+02 • RAST – PA Report from metrics regarding RE/04: Upon completion of Output 2 +03
Potential Blockers:	a)Strategic Challenges i)Incorporate new audience in addition to airline's pilots ii)Distribution of training material to airlines

iii)Distribution of training material to non-airline pilots
iv)Establish and maintain communication with the Pan American pilots and other stakeholders
v)Operators to include recommendations into their Manual of Operations
vi)Operators to include recommendations into their training programmes
vii)Get feedback
viii)Metrics to determine penetration of this programme

DIP Notes:

1. Research to determine the target audience(s) Determine the specific groups of pilots to be reached in order to achieve our objective Determine other stakeholders that would benefit.

2. Communication and distribution options: Letter from RASG-PA Secretary to recommend that all operators establish SOP's that include stabilized approach criteria for pilots and a no fault go-around policy for unstable approaches, mentioning the FSF/IATA Runway Excursion Risk Reduction Tool Kit. Letter from RASG-PA Secretary to States recommending that all operators establish SOP's that include stabilized approach criteria for pilots and a no fault go-around policy for unstable approaches, mentioning the FSF/IATA Runway Excursion Risk Reduction Tool Kit.

3. Press releases from ALTA, IATA, IFALPA. 4. RASG-PA website news release, uploading of training material and E-mails to target audience

Keep in mind that there is no contradiction with the pressure for pilots in the subsequent flight analysis.

RAST-PA/RE/04 Output 1

Description:	Distribution
Resources:	
Resource Notes:	Cost of the material and distribution to the operators.
Time Line:	SCA+ 5 months
Actions:	1. RAST/RE recommends that all operators establish SOP's that include stabilized approach criteria for pilots and a no fault go-around policy for unstable approaches. 2. In coordination with FSF and IATA, RAST/RE should develop an awareness campaign to promote the adherence to SOP's for approach procedures including the go-around decision making process. The campaign will distribute the FSF/IATA Runway Excursion Risk Reduction Tool Kit, the Colegio de Pilotos Aviadores de Mexico Aeronautical Decision Management training, and any other available material. 3. Time to train trainers

Target Completion Date: 12

RAST-PA/RE/04 Output 2

Description:	Training
Resources:	
Resource Notes:	Variable costs depending on the operator.
Time Line:	SCA+ 15 months
Actions:	Operators to include material in training programs.

Target Completion Date:

Rast No	Safety Enhancement Action	Reference	GSI	Safety Impact	Changeability	Indicator	Priority	Time Frame
RAST-PA/RE/08	Guidance in maintaining runway in accordance with Annex 14 (put this point next to 6)	Annex 14, Doc 9137 ICAO	1	High	Easy	P1	3	Short

Safety Enhancement Action (expanded):	To reduce runway condition/maintenance related accidents and incidents at airports by following a runway maintenance guide in accordance with ICAO Annex 14.
Statement of Work:	Establish a team who will compile and develop, if necessary, runway maintenance guidance for airports in the Panamerican region.
Champion Organization:	ACI-LAC
Human Resource:	CAAs, ICAO, ACI, IATA, ALACPA, Airport Operators, Maintenance staff and providers.
Financial Resource:	To be determined, in-kind support to develop the guidance material.
Relation Current Aviation Community Initiative:	ACI Airside Safety Handbook Annex 14 ICAO Doc 9137 Airport Services Manual Par 2 – Pavement Surface Conditions ICAO Doc 9157 Part 4 Visual Aids Runway excursion risk reduction toolkit
Performance Goal Indicators:	Goal 1: Create a guide that collects best practices for runway maintenance. Indicator: Online availability of the guide. Goal 2: Promote and encourage the use of the guide. Indicator: RASG-PA promotion of the guide. Goal 3: airports implement their maintenance plans according to this guide. Indicator: A measurable amount of airports that incorporate the use of the guide into their action plans. Goal 4: Reduce the occurrence of runway condition related incidents and accidents. Indicator: A measurable and continued reduction in runway condition related incidents and accidents.
Key Milestones:	DIPESC X Approval Output 1 The guide ESC X Date + 6

Output 2 Promote   Output 1 + 12
Output 3   Implementation of the guide   Output 1 + 18

Potential Blockers:	- Lack of resources to establish the plans correctly - Differences between CAAs and airport operators - Weaknesses in regulatory oversight - Airport operators may not recognize safety enhancement benefits of implementing the plan according to the guidelines - Data sharing
DIP Notes:	RASG-PA, Annual Safety Report Team (ASRT), will review collected data on a yearly basis. This data will be reflected in the annual RASG-PA Safety Report

RAST-PA/RE/08 Output 1

Description:	Create a guide that collects best practices for runway maintenance.
Resources:	
Resource Notes:	ACI
Time Line:	6 months
Actions:	Establish a team who will compile and develop, if necessary, runway maintenance guidance for airports in the Pan American region. The team should be composed of at least; an ICAO Annex 14 expert, a representative from aerodromes and Aerodrome cognizant CAA representative. Once available the guidance should be translated into Spanish.
Target Completion Date:	

RAST-PA/RE/08 Output 2

Description:	Promote and encourage the use of the guide.
Resources:	
Resource Notes:	RASG-PA
Time Line:	12 months
Actions:	Produce information material that may be disseminated at events throughout the Region. Call on RASG-PA Members to disseminate the information.
Target Completion Date:	

RAST-PA/RE/08 Output 3

Description:	Airports implement their maintenance plans according to the runway maintenance guide.
Resources:	
Resource Notes:	ACI, RST's
Time Line:	18 months
Actions:	Use a data-driven approach to identify aerodromes that could benefit from improved runway maintenance. Encourage RST at Airports to use the runway maintenance guide and track outcomes through their action plans. Track aerodrome action plans to determine the number of aerodromes that are using the guide.
Target Completion Date:	

Rast No	Safety Enhancement Action	Reference	GSI	Safety Impact	Changeability	Indicator	Priority	Time Frame
RAST-PA/RE/09	Specific Training for pilots and air traffic controllers to avoid unstabilized approaches		9	High	Easy	P1	2	Short

Safety Enhancement Action (expanded):	Develop safety seminars for pilot and air traffic controllers to mitigate the causes of unstable approaches in Pan America.
Statement of Work:	Runway Excursion has been identified as one of the highest safety risk area in Pan America. In order to proactively reduce this risk, RAST in collaboration with ALTA will develop safety seminars for pilots and controllers that will provide specific training and tools to mitigate the causes of unstable approaches and related actions as requiered.
Champion Organization:	ALTA
Human Resource:	IATA, ATA, ATAC, ACSA, ICAO, aircraft manufacturers, IFALPA, IFATCA, flight data analysis companies (Sagem, ADI, Airfase, etc.), organizations, CANSO, local pilot and air traffic controller associations, flight academies, training centers and other stakeholders.
Financial Resource:	Costs would be shared by the operators, manufacturers, pilot associations and governments.
Relation Current Aviation Community Initiative:	- Runway Safety Action Teams (RSAT); local equivalent collaborative teams in Pan America.
Performance Goal Indicators:	Goal: reduce occurrence of runway excursion accidents. Indicator: a measurable reduction of runway excursion incidents and accidents.
Key Milestones:	The following milestones are based on the date of SCA approval (months): - Survey & Reports SCA + 6 - Seminars Output 1 + 24
Potential Blockers:	- Insufficient funds to conduct seminars - Inadequate implementation of recommendations from outputs - Participation from industry - Human resources, specialists, facilitators - Language barriers - Obtaining copyright approval for available training material - Political barriers - Data sharing restrictions

     - Time availability

DIP Notes: Impact on Aviation Safety in the Region:
                   This project would have a positive impact on aviation by avoiding accidents and incidents related to runway excursion.

RAST-PA/RE/09 Output 1

Description: ALTA will conduct a survey within its operators regarding the actions taken to mitigate unstable approaches.

Resources:

Resource Notes: ALTA members

Time Line: SCA + 6 months

Actions: The information obtained will be presented and be used to prepare the content for the safety seminars.
                   The goal will be to identify needs and share best practices to improve training methods.

Target Completion Date:

RAST-PA/RE/09 Output 2

Description: Develop a strategy to deliver safety seminars for pilots and controllers in Pan America that targets recognition and avoidance of unstable approaches.

Resources:

Resource Notes: Stakeholders as listed above

Time Line: Output 1 + 24 months

Actions: Develop a strategy and timeline to deliver safety seminars for pilots and controllers.

At a minimum the following topics should be covered:
- Stabilized Approaches
- Go Around Gates and Missed Approach Criteria
- Approach Procedures and Briefings
- Non Normal Aircraft Conditions
- Transfer of Aircraft Control
- CRM/TRM and human factors
- Weather conditions and information dissemination including tail wind landings

During the safety seminars participant will be asked to provide additional mitigation measures that will be compiled and used as the basis of future safety enhancements for runway exercusions.

Target Completion Date:

Rast No	Safety Enhancement Action	Reference	GSI	Safety Impact	Changeability	Indicator	Priority	Time Frame
RAST-PA/RE/11	Develop guidance material and training programs to create action plans for runway safety teams.	Annex 14, ICAO Doc. 9137, IATA, FAA, IFALPA Airport Liaison Program	9	High	Easy	P1	1	Short

Safety Enhancement Action (expanded):
To reduce runway related accidents and incidents at airports by identifying airport specific hazards and developing mitigations.

Statement of Work:
Establish the framework to create Runway Safety Teams (RST) which will evaluate airports for hazards and implement the appropriate mitigations. Facilitate the sharing of data, training material, mitigations, and workshops.

Champion Organization:
Mexico

Human Resource:
CAAs, ICAO, Airport Operators, Air Operators, Air Traffic Management/Communication Navigation Surveillance providers, Fixed Base Operators, Pilots.

Financial Resource:
Database creation, workshops, RASG-PA resources for material compilation.

Relation Current Aviation Community Initiative:
ICAO Global and Regional Runway Safety Initiative, Flight Safety Foundation Runway Safety Initiative, Commercial Aviation Safety Team Safety Enhancement

Material currently available:

- ICAO (http://www2.icao.int/en/RunwaySafety/Pages/Toolkits.aspx)
- Flight Safety Foundation (http://flightsafety.org/current-safety-initiatives/runway-safety-initiative-rsi)
- Federal Aviation Administration (http://www.faa.gov/airports/runway_safety/resources/lrsat/)
- EUROCONTROL (http://www.eurocontrol.int/runwaysafety/public/standard_page/keyActions.html)
- IFALPA (http://ifalpa.org/ifalpa-training/alr/alr.html)

Performance Goal Indicators:
Goal 1: Establish a runway safety team (RST) at the busiest airport of each contracting State in the Pan American region in terms of operations per year.
Indicator: Twelve teams established per year.

Goal 2: Establish a RST at all international airports of each contracting State in the Pan American region.
Indicator: Twelve teams established per year.

Goal 3: Reduce the occurrence of runway related incidents and accidents.
Indicator: A measurable reduction in runway related incidents and accidents.

Key Milestones:	DIP	ESC X Approval
	Output 1 Gather & Publish information	ESC 10 Date + 3
	Output 2 Checklist	Output 1 + 6
	Output 3 Database	Output 1 + 6
	Output 4 Roll out plan	Output 3 + 6
	Output 5 Review and update	Output 4 + 6

Potential Blockers:
- Lack of resources to establish RSTs
- Differences between CAAs and airport operators
- Airport operators may not recognize safety enhancement benefits
- Data sharing
- Lack of resources to implement mitigations

DIP Notes:
RASG-PA, Annual Safety Report Team (ASRT), will review collected data on a yearly basis. This data will be reflected in the annual RASG-PA Safety Report.

Multidisciplinary runway safety teams are envisaged to work with airport operators to identify areas of opportunity and available resources to enhance runway safety for specific aerodromes.

RAST-PA/RE/11 Output 1

Description: Gather and publish in the RASG-PA website available material that may be used to mitigate hazards related to runway safety.

Resources:

Resource Notes: ICAO

Time Line: 6 months

Actions: Publish or make links available to websites such as FSF, CAST, FAA, EURCONTROL and IFALPA which RST may use to proposed mitigation actions for identified hazards related to runway safety.

Target Completion Date:

RAST-PA/RE/11 Output 2

Description: Electronic checklist development

Resources:

Resource Notes: ICAO, IFATCA, IATA & ACI

Time Line: 6 months

Actions: Develop an electronic checklist based on best practices and threat and error management that RST may use to identify hazards and propose mitigation actions. The checklists should address the following areas:
- ATM/CNS
- Air operators
- Airport
- Before releasing final versions of the checklists, field test in a pilot project
- Translate Checklists into Spanish

Target Completion Date:

RAST-PA/RE/11 Output 3

Description: Establishment of a regional Runway Safety Database

Resources:

Resource Notes: ICAO

Time Line: 6 months

Actions: Create a Regional database that will house the data from the checklists (Output 2) with at least the following considerations:
- Option to de-identify the source of the information
- Where possible responses should be selectable (rather than free text)
- Contain appropriate level(s) of data entry

- Consider the legal aspects of data sharing
- Capture the resulting mitigation actions and their end result
- Before releasing final versions of the checklists/database interface, field test in a pilot project
- Spanish version

Target Completion Date:

RAST-PA/RE/11 Output 4

Description:	Develop a roll out plan
Resources:	
Resource Notes:	RAST-PA / FSTT-PA
Time Line:	6 months
Actions:	Organize workshops in Pan America to disseminate the information and train on: - Establishment of RST - The use of the DB - The use of the checklist - Finding Material related to runway safety.

Target Completion Date:

RAST-PA/RE/11 Output 5

Description:	Review and Update of the Runway Safety Teams
Resources:	
Resource Notes:	RAST-PA
Time Line:	6 months
Actions:	Develop a process to review on a two times a year basis the number of RSTs established and ensure that all relevant runway safety material is maintained updated.

Target Completion Date:

Rast No	Safety Enhancement Action	Reference	GSI	Safety Impact	Changeability	Indicator	Priority	Time Frame
RAST-PA/CFIT/02	Specific ALAR/CFIT Training for Pilots	SE-12, ALAR Toolkit, FSF CFIT Training	9	Medium	Moderate	P5	1	Short

Safety Enhancement Action (expanded):	Promote specific ALAR/CFIT prevention training and procedures to be included in operators approved training curriculums, emphasizing pilot situational awareness and escape procedures for flight crews to use in the event of a terrain warning indication.
Statement of Work:	Controlled Flight Into Terrain (CFIT) has been identified as one of the top three data driven risk areas in Pan-America. CFIT is a significant cause of commercial aviation equipment loss and fatalities, worldwide. CFIT accidents could be substantially reduced if all operators and training centers in Pan America developed CFIT prevention procedures and add them to their approved initial and recurrent training curriculums.
Champion Organization:	IATA
Human Resource:	CAA's, ICAO, IATA, ATA, ALTA and industry partners.
Financial Resource:	
Relation Current Aviation Community Initiative:	•RASG-PA has identified CFIT as the number two flight safety risk area in Pan America. •Flight Safety Foundation (FSF) has recently updated (April 2010) the ALAR Toolkit that includes CFIT Education and Training.
Performance Goal Indicators:	Goal 1: A reduction of 80% in ten years of CFIT accidents involving operators in Pan America. Indicator: Operator CFIT accident rate in Pan America is continuously reduced toward the goal. Goal 2: CFIT training and guidance material will be provided to all operators and training centers not conducting CFIT training. Indicator: All operators and training centers are conducting CFIT training. Goal 3: Post CFIT Education and Training Guidance Material on the RASG-PA Website. Indicator: CFIT training material posted on the RASG-PA Website prior to completion of Output 1.
Key Milestones:	•CAA's conduct a review of all operators CFIT training programs SCA + 6 months •CFIT Education and Training Guidance Material Available on the Web. SCA + 2 months •Operators and training centers will incorporate CFIT training into their training programs. SCA + 12 months
Potential Blockers:	•Availability of CAA resources.

•Operators may not recognize the safety enhancement benefits

DIP Notes:

RAST-PA/CFIT/02 Output 1

Description:	CAA's conduct a review of all operators to ascertain which operators have CFIT prevention training and procedures in their approved training programs.
Resources:	
Resource Notes:	CAA (Flight Safety Oversight Department) Estimate of 2 to 4 CAA man-hours per airline to complete operator review CAA Inspector review checklist
Time Line:	SCA+ 6 months
Actions:	Through the flight safety oversight departments, CAA's will direct inspectors to conduct a review of their operator and identify which operators provide CFIT prevention training and procedures within their approved training programs.

Target Completion Date:

RAST-PA/CFIT/02 Output 2

Description:	If an operator does not have CFIT training, he will be encouraged to incorporate CFIT training into the airline training program.
Resources:	
Resource Notes:	Operators, CAA's and ICAO Variable cost depending on the operator and the number of pilots
Time Line:	SCA+ 16 months
Actions:	Operators will incorporate CFIT prevention training and procedures into their training programs.

Target Completion Date:

Rast No	Safety Enhancement Action	Reference	GSI	Safety Impact	Changeability	Indicator	Priority	Time Frame
RAST-PA/CFIT/04	CRM/Situational Awareness for pilots and air traffic controllers (To include review of actual events when possible)	SE -11, SE-46, SE-47	12	Medium	Moderate	P5	2	Medium

Safety Enhancement Action (expanded): Include specific CRM/situational awareness training and procedures to all pilots and air traffic controller training curriculums, emphasizing pilot and controller situational awareness with respect to CFIT.

Statement of Work: Crew Resource Management/Controller Resource Management (CRM) training, situational awareness and CFIT prevention are closely linked. This project will reduce CFIT accidents by promoting comprehensive pilot and air traffic controller CRM training programs.

Champion Organization: IFALPA/IFATCA

Human Resource: CAA's, ICAO, ANSP's, IFALPA, IFATCA, IATA and industry partners.

Financial Resource:

Relation Current Aviation Community Initiative:
• RASG-PA website (http://www.mexico.icao.int/RASGPA.html#TrainingRefs)
• FSF virtual library   (http://flightsafety.org/)
• ALAR Briefing Note – Crew Resource Management (http://flightsafety.org/files/alar_bn2-2-crm.pdf)
• Airbus   (http://www.airbus.com/en/corporate/ethics/safety_lib/)
• Boeing operators (www.myboeing.com)

Performance Goal Indicators:
Goal 1: A substantial reduction of CFIT accidents involving air transport operators in Pan America.
Indicator: Operator CFIT accident rate in Pan America decreases by 80%.

Goal 2: CRM/situational awareness training and guidance material provided to all air transport operators and Air Traffic Personnel.
Indicator: Increase in number of operators and Air Traffic Personnel that are conducting CRM/situational awareness training.

Goal 3: Post the CRM/situational awareness guidance material on the RASG-PA Website.
Indicator: CRM/situational awareness guidance material posted on the RASG-PA Website by the time of SCA +2 months.

Key Milestones:
• CRM/situational awareness training and guidance material available on the Web. SCA +2 months
• Operators will incorporate CFIT training into their training program. SCA +18 months
• ANSP will incorporate CFIT training into their training program. SCA+ 24 months

Potential Blockers:	• Availability of CAA/ANSP/State resources.
	• Operators, States and ANSP may not recognize the safety benefits
DIP Notes:	All communications to States should be conducted through the RASG-PA Secretariat. Guidance on coordinating with ICAO and identifying which operators and ANSPs are providing CFIT prevention training and procedures within their approved training programs may be useful to States.
	ATC training in this area has already been developed

RAST-PA/CFIT/04 Output 1

Description:	Incorporate and/or update CRM/situational awareness training programs for all flight crew members of air transport operators emphasizing aircraft position with relation to terrain and reviewing past occurrences.
Resources:	
Resource Notes:	Air transport operators (training departments), Variable cost depending on the operation
Time Line:	SCA+ 18 months
Actions:	Reduce the CFIT accident rate by incorporating CFIT prevention in CRM training programs. Situational awareness will be emphasized as an integral part of the CRM training required of flight crewmembers of all air transport operators.
Target Completion Date:	

RAST-PA/CFIT/04 Output 2

Description:	Incorporate CRM/situational awareness training programs for all air traffic controllers of air navigation service providers (ANSP) emphasizing aircraft position with relation to minimum allowable altitudes.
Resources:	
Resource Notes:	ANSP's (training departments), CRM/situational awareness guidance material posted on the RASG-PA Website Variable cost depending on the ANSP
Time Line:	SCA+ 24 months
Actions:	Reduce the CFIT accident rate by incorporating CFIT prevention in CRM training programs. Situational awareness will be emphasized as an integral part of the CRM training required of air traffic controllers of all ANSPs.
Target Completion Date:	

Rast No	Safety Enhancement Action	Reference	GSI	Safety Impact	Changeability	Indicator	Priority	Time Frame
RAST-PA/LOC-I/06	LOC Training – Human factors and automation	SE 30	9	High	Moderate	P2	3	Short

Safety Enhancement Action (expanded):
To improve the overall performance of flight crews to recognize and prevent loss of control accidents, through effective use of automation.

Statement of Work:
To reduce loss of control accidents, operators will be encouraged to adopt consensus policies and procedures relating to mode awareness and energy state management aspects of flight deck automation, as appropriate to their respective operations.

Champion Organization:
RASG-PA (RAST-PA)

Human Resource:
IATA, Pilot Associations; Safety, Flight Operations and Training managers; ICAO, CAA's, aircraft manufacturers, training centers.

Financial Resource:
The total estimated cost would be X person-years.

Relation Current Aviation Community Initiative:
The following are some of the activities related to this project:

•Incident data has shown that flight deck automation is a core issue that needs to be addressed. To enhance safety, a CAST working group, including aircraft manufactures, pilot associations, etc. developed a tactical approach and distributed policies and procedures relating to mode awareness and energy state management. The COSCAP's in Asia used this material to develop a generic advisory circular.

•CAST Flight Deck Automation Working Group has been formed to recommend and prioritize actions to address, for current and projected operational use, the safety and efficiency of modern flight deck systems for flight path management (including energy state management).

•The Human Factors and Pilot Training Group of the ALPA, Air Safety Structure has identified its position regarding CRM and Human Factors with respect to the use of automation.

•SAE G10, Aerospace Behavioral Engineering Technology (ABET) Committee, deals with the philosophies, principles and criteria by which designers, engineers, pilots and behavioral scientists structure systems to achieve maximum human workload compatibility for automation efficiency. The committee has several subcommittees with on-going work into human factors and automation

Performance Goal Indicators:
Goal 1: Mitigate the effects of mode confusion and energy state management as contributing factors in loss of control accidents.
Indicator: A measurable reduction of loss of control incidents and accidents related to automation.

Goal 2: Mode awareness and energy state management aspects of flight deck automation advisory circular is readily available.
Indicator: Each ICAO contracting State in the region has issued an advisory circular and distributed it to each operator's in the State. Completion of Output 3.

Goal 3: All operators incorporate mode awareness and energy state management aspects of flight deck automation guidance in their approved training programs.
Indicator: Mode awareness and energy state management aspects of flight deck automation guidance is provided to all transport airplane pilots Completion of Output 4.

Key Milestones:
The following milestones are based on the date of Steering Committee Approval (SCA) (months):
• Review Asian advisory circular IATA SCA+6
• Issue generic advisory circular ICAO Output 1 +1
• Issuance of advisory circular by States in the Region. CAAs Output 2 +6
• Operators develop guidance based on the AC and train pilots. Operators Output 3 + 18
• Track Implementation RASG-PA SCA +12 and yearly

Potential Blockers:
• Operator might not embrace advisory circular material,
• Operators might not accept the potential cost of this training,
• Operators may not recognize the safety enhancement benefits,
• States may opt not to adopt and issue the advisory circular.

DIP Notes:

To reduce loss of control accidents, air carriers will be encouraged to adopt consensus policies and procedures relating to mode awareness and energy state
management, as appropriate to their respective operations.

RAST-PA/LOC-I/06 Output 1

Description:
Review and evaluate the advisory circular created by the ICAO COSCAP's in Asia

• ALTA / IFALPA / IATA team to review and evaluate the advisory circular created by the ICAO COSCAP's in Asia related to mode awareness and energy state management of flight deck automation.
• Based on this review create a generic advisory circular for the Region

Resources:

Resource Notes:
ALTA, IFALPA, IATA, Pilot Associations, Flight Operations, Safety and Training managers, and Aircraft Manufacturers. The estimated cost of a one day meeting of the appropriate persons.

Time Line:
SCA + 6 months

Actions:
ALTA / IFALPA / IATA will convene a team to analyze the advisory circular, to verify policies and procedures related to mode awareness and energy state management are appropriate for the Region. The team will develop a generic mode awareness and energy state management aspects of flight deck automation advisory circular for Pan America.

Target Completion Date:

RAST-PA/LOC-I/06 Output 2

Description:
• ICAO will distribute a copy of the developed generic advisory circular to each State in the Region.

Resources:

Resource Notes:
ICAO

Time Line:
Completion of Output 1 + 1 months

Actions:
ICAO Regional Offices will prepare a cover letter and disseminate the generic advisory circular to each member State in the Region.

Target Completion Date:

RAST-PA/LOC-I/06 Output 3

Description:
• Each State in the region will use the generic advisory circular as a template to prepare a State advisory circular on mode awareness and energy state management aspects of flight deck automation.

Resources:

Resource Notes:
State regulatory authorities

Time Line:
Completion of output 2 + 9 months

Time Line:	Completion of output 2 + 9 months
Actions:	States in the Region to issue their own advisory circular on mode awareness and energy state management aspects of flight deck automation.
Target Completion Date:	

RAST-PA/LOC-I/06 Output 4

Description:	Mode awareness and energy state management aspects of flight deck automation guidance is provided by operators to all of their pilots.
Resources:	
Resource Notes:	Operator's flight operations, standards and training departments.
Time Line:	Completion of Output 3 + 18 months
Actions:	Each operator should carefully developed procedures and guidelines that support the proper use of mode awareness and energy state management aspects of flight deck automation in their training programs. Each transport airplane pilot should be trained to the flight deck automation procedures and guidelines developed by their organization.
Target Completion Date:	

Rast No	Safety Enhancement Action	Reference	GSI	Safety Impact	Changeability	Indicator	Priority	Time Frame
RAST-PA/LOC-I/07	LOC Training – Advanced maneuvers	SE 31	9	High	Moderate	P2	1	Short

Safety Enhancement Action (expanded):	Promote LOC Training – Advanced maneuvers Pilots will be better trained to avoid and recover from excursions from normal flight and loss of control.
Statement of Work:	Advanced Maneuvers Training (AMT) focuses on training to prevent and recover from hazardous flight conditions outside of the normal flight envelope, such as, inflight upsets, stalls, ground proximity and wind shear escape maneuvers, and inappropriate energy state management conditions. There has been a recent increase in accidents where loss of control was a contributing factor. The purpose of this project is to collect and provide advanced maneuver training material and to encourage operators to use these materials to implement advanced maneuver ground training and flight training using appropriate flight training equipment. Emphasis should be given to stall onset recognition and recovery, unusual attitudes, upset recoveries, effects of icing, energy awareness and management, and causal factors that can lead to loss of control
Champion Organization:	ALTA
Human Resource:	Airline Associations, Pilot Associations; Safety, Flight Operations, and Training managers, aircraft manufacturers, ICAO, flight simulation device manufacturers, training centers, existing training aids, and new materials developed by manufacturers.
Financial Resource:	The total cost associated with this project would be determined by the number of crew personnel that need to be trained and the amount of training time required. This initiative is considered essential for flight safety, there would be no cost associated with the devel
Relation Current Aviation Community Initiative:	•Voluntary training currently being done – both ground and flight •Wind shear training required since 1988 •Airplane Upset Recovery Training Aid •Commercial training products becoming available
Performance Goal Indicators:	Goal 1: Develop and make available AMT material for operators approved training programs Indicator: Availability of the AMT material within 8 months of SCA. Goal 2: All operators incorporate AMT in their approved training programs. Indicator: Operators incorporate AMT material within 36 months of SCA. Goal 3: Reduce occurrence of LOC accidents.

Indicator: A measurable reduction of loss of control incidents and accidents related to excursion from normal flight.

Key Milestones:	The following milestones are based on the date of Steering Committee Approval (SCA) (months): •Distribute currently available Training Aids ALTA SCA +8 •Track adoption of AMT ALTA SCA +8 •Track Implementation SCA+8 and on a yearly basis
Potential Blockers:	•Some special interests might discredit AMT simulator training •Operators might ignore AMT materials •Operators might not accept the potential cost of this training •Operators may not recognize the safety enhancement benefits
DIP Notes:	

Advanced Maneuvers Training (AMT) refers to training to prevent and recover from hazardous flight conditions outside of the normal flight envelope. Examples include in-flight upsets, stalls, ground proximity and wind shear escape maneuvers, and inappropriate energy state management conditions. This safety enhancement collects and provides advanced maneuver training material and encourages operators to use these materials to implement advanced maneuver ground and flight training using appropriate flight training equipment. Emphasis should be given to stall onset recognition and recovery, unusual attitudes, upset recoveries, effects of icing, energy awareness and management, and causal factors that can lead to loss of control.

RAST-PA/LOC-I/07 Output 1

Description:	Listing of training materials available from regulators, industry, operators, academia and other resources.
Resources:	
Resource Notes:	RAST-PA Secretariat (NACC office) will produce a comprehensive list, with input from all RAST-PA members. All aircraft manufacturers should provide a list of available training materials and aids. FAA Airplane Upset Recovery Training Aid: is available on its public web site.
Time Line:	SCA+ 5 months
Actions:	RAST-PA should distribute the Airplane Upset Recovery Training Aid to all appropriate regional stakeholders.
Target Completion Date:	

RAST-PA/LOC-I/07 Output 2

Description:	Advanced Maneuvers Training provided to all operators.
Resources:	10000
Resource Notes:	Estimated distribution costs in USD. ALTA, IATA
Time Line:	Output 1 Complete + 3 months
Actions:	ALTA should provide the training materials to each operator in the region. IATA should support ALTA's initiative. ALTA should report the level of commitment by the operator's flight operations and training departments.
Target Completion Date:	

RAST-PA/LOC-I/07 Output 3

Description:	Advanced Maneuvers Training provided by all operators. The expectation is that this training will be accomplished during initial training and as part of the recurrent training program, via ground and simulator instruction within the certified flight envelope, with emphasis on recognition, prevention and recovery techniques.
Resources:	
Resource Notes:	Costs may vary from operator to operator and would need to consider; 1) Revising the training program for AMT. 2) Assessing the simulator time allotted on the initial and recurrent syllabuses to accommodate AMT. 3) It is estimated that AMT training would require 30 minutes or less of simulator time.
Time Line:	Output 2 Complete + 28 months
Actions:	ALTA and IATA should promote a high level of commitment to advanced maneuvers training (AMT) by operator flight operations and training departments. Advanced

maneuvers training will be conducted emphasizing energy state management and early recognition and recovery from flight outside the certified aircraft-operating envelope.Flight conditions outside of the certified flight envelope include inflight upsets, stalls, ground proximity and wind shear escape maneuvers, and inappropriate energy state management conditions. The training will be accomplished via ground and simulator instruction within the certified flight envelope, with emphasis on recognition, prevention and recovery techniques. The simulator instruction will be within the limitation of the training device being utilized.

Target Completion Date:

Rast No	Safety Enhancement Action	Reference	GSI	Safety Impact	Changeability	Indicator	Priority	Time Frame
RAST-PA/LOC-I/09	LOC Training – Pilot monitoring policies and procedure for the operator and training program for crews.		9	High	Easy	P1	2	Short

Safety Enhancement Action (expanded): Promote Pilot Monitoring Techniques and Training. Monitoring performance can be significantly improved by training these skills

Statement of Work: The purpose of this project is to collect and provide pilot monitoring training material and to encourage operators to use these materials to implement pilot monitoring training and flight procedures.

Inadequate flight crew monitoring has been cited by a number of sources as a problem for aviation safety. A collaborative research effort by NASA-Ames, 21 worldwide airlines and the University of Texas Human Factors Research Program, which observed more than 2,000 airline flights, noted that roughly 62 percent of unintentional errors went undetected by flight crews. In addition, the Flight Safety Foundation, ALAR working group, has established that poor monitoring has been a factor in 63 percent of approach and landing accidents. ICAO has also determined that 50 percent of CFIT accidents had pilot monitoring as a common factor.

The term 'Pilot Monitoring' (PM) should be used as an alternative to 'Pilot Not Flying' (PNF) since it reflects clearly the most important function of a PNF.

Conventionally, when two pilots fly a fixed-wing airplane the aircraft commander occupies the left hand seat, and the co-pilot or first officer occupies the right hand seat. Before the commencement of each flight leg, the aircraft commander decides which pilot will take direct responsibility for flying the aircraft and they become 'Pilot Flying' (PF) for that leg. The other pilot is then 'Pilot Not Flying' (PNF) and carries out supporting duties such as communications and check-list reading. Currently some operators use alternative terms for PF and PNF.

Several major airlines have recently revised their procedures to maximize the monitoring of aircraft trajectory, automation and systems. They have tried to minimize or eliminate concurrent procedures that conflict with crew monitoring.

Champion Organization: IFALPA

Human Resource: Pilot Associations, IATA, ALTA, ICAO, Flight Operations, and Training managers, training centers, existing training aids.

The total cost associated with this project would be determined by the number of flight crews that need to be trained and the amount of time required. This initiative is considered essential for flight safety.

Estimated 2 meetings of RAST representatives to implement Output 1.

Financial Resource:

Relation Current Aviation Community Initiative:
- Aligns with major findings by ICAO, FSF, NTSB.
- Aligns with components of CRM

Performance Goal Indicators:
Goal 1: Reduce occurrence of LOC accidents.
Indicator: A measurable reduction of loss of control incidents and accidents related to deviations from normal flight.

Goal 2: Pilot Monitoring Training material is readily available.
Indicator: Availability of the Pilot Monitoring Training material in each operator's organization within 2 months of Output 3.

Goal 3: All operators incorporate Pilot Monitoring Training in their approved training programs.
Indicator: Pilot Monitoring Training is provided to all transport airplane pilots. Within 18 months of Output 4.

Key Milestones:
The following milestones are based on the date of Steering Committee Approval (SCA) (months):
- Distribute currently available Training Aids ALTA SCA+5
- Track adoption of Pilot Monitoring Training ALTA SCA+12

Potential Blockers:
- Operators might not accept the potential cost of this training
- Operators may not recognize the safety enhancement benefits

DIP Notes:

Pilot Monitoring policies and procedure for the operator and training program for crews.

RAST-PA/LOC-I/09 Output 1

Description:
- Listing of training materials available from industry, operators, and other resources.

Resources:

Resource Notes:
RASG-PA Secretariat (NACC office) will produce a comprehensive list.

Time Line:
SCA + 5 months

Actions:
RASG-PA should distribute the Pilot Monitoring Training Aid to all appropriate regional stakeholders (IATA, ALTA, CAA, etc.).

Target Completion Date:

RAST-PA/LOC-I/09 Output 2

Description:
- Raise awareness of availability and need of Pilot Monitoring Training.

Resources:

Resource Notes:
IFALPA, Local Pilot Associations

Time Line:
Completion of Output 1 + 1 months

Actions:
IFALPA, ALTA and local pilot associations should market and promote ongoing activities that develop a higher level of commitment to Pilot Monitoring Training by operator's flight operations, standards and training departments.

Target Completion Date:

RAST-PA/LOC-I/09 Output 3

Description:
- Pilot Monitoring Training material provided to all operators.

Resources:

Resource Notes:
ALTA, IATA, CAA's

Time Line:
Completion of Output 1 + 2 months

Actions:
ALTA should provide the training materials to each operator in the region. IATA should support ALTA's initiative. ALTA should report to RASG-PA the level of commitment by the operator's flight operations and training departments.

Target Completion Date:

RAST-PA/LOC-I/09 Output 4

Description: •Pilot Monitoring Training provided by operators to all of their pilots.

Resources:

Resource Notes: Operator's flight operations, standards and training departments, pilot associations.

Time Line: Completion of Output 3 + 18 months

Actions: Each operator should carefully developed procedures and guidelines that support pilot monitoring in their training programs.   Each transport airplane pilot should be trained to the Pilot Monitoring procedures and guidelines developed by their organization.

Target Completion Date:

**Appendix C**

Runway excursions

1.   Safety performance indicators

1.1   To obtain the performance indicators referred to runway excursions and incursions accidents category, commercial scheduled and non-scheduled operations accidents of aircraft above 5,700 kg have been considered, resulting in the following figures for the period 2005 - 2012:

- ✓ accidents associated to runway excursions category were 19, and
- ✓ no accidents associated to runway incursions were identified in the SAM Region.

1.2   *Table C-1a – SAM Region runway excursions*, identifies the year, total runway excursions accidents, departures and accidents rate by one million departures, while *Table C-1B* shows runway excursions accidents rate projection.

Table C-1 – SAM Region runway excursions

Accident rate by SAM Region runway excursions accident			
Year	Total accidents	SAM departures	SAM accidents rate
2005	1	1,156,272	0.86
2006	1	1,195,107	0.83
2007	5	1,289,860	3.87
2008	4	1,369,691	2.92
2009	4	1,507,869	2.65
2010	1	1,777,672	0.56
2011	3	1,918,423	1.56
2012	0	1,953,982	0.00
Total	19	12,169,876	**1.56**

Table C-2 – Runway excursion accidents rate projection
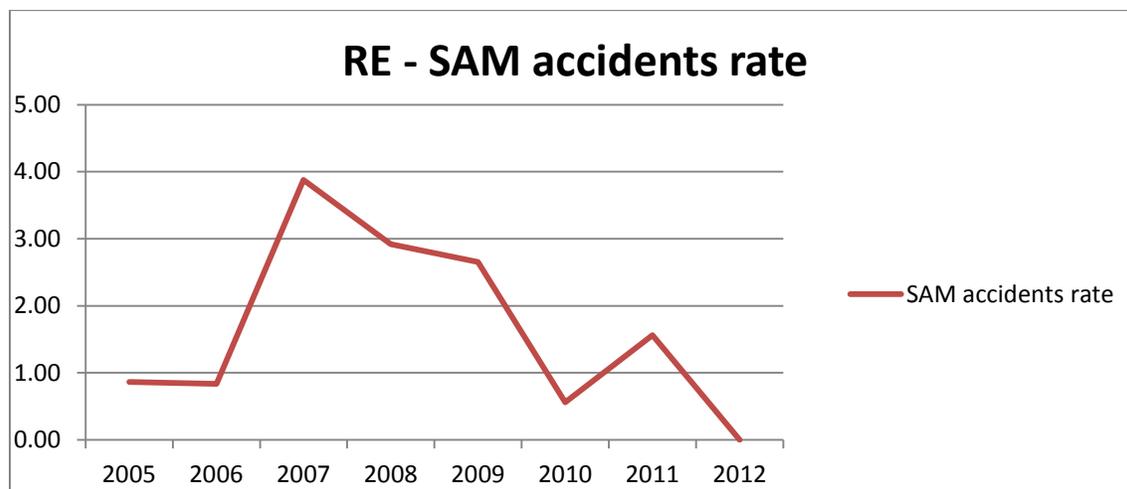
1.3   The previous graphs show that during years 2007, 2008, 2009 and 2011present an abrupt increase in the runway excursion accidents rate. However, for the years 2010 and 2012, this rate decreased, reaching zero in year 2012. Note has to be taken that not all runway excursion accidents have been reported by States. In this regard, States are encouraged to implement or continue implementing safety enhancements to avoid repeating accidents under this category.

2.   Safety performance target proposal

2.1   Targets translated to runway excursion accidents rate per each million departures should be the parameter that SAM Region should reach in the following three-year periods:

- ✓ Short term (January 2014 - December 2016):

  - ➢ Rate not higher to the average for period 2005-2012: **1.56**

- ✓ Medium term (January 2017- December 2019):

  - ➢ 30% less than the rate reached the prior period

- ✓ Long term (January 2020 – December 2022)

  - ➢ 50% less than the rate reached the prior period.

3.   Safety enhancement proposals to reduce accidents by runway excursion

3.1   The following safety enhancements are being proposed to reduce runway excursion
accidents rate:

- ✓ Short term (January 2014 - December 2016):

  - ➢ Implementation of ICAO runway safety tool kit.

  - ➢ Effective implementation of the runway safety teams (RST) in the international aerodromes.

  - ➢ Effective implementation of reactive, proactive and predictive safety processes (FDA) related to runway excursions by commercial air transport operators.

  - ➢ Effective implementation of the advanced qualification programme (AQP) or ICAO evidence-based training (EBT) (non-stabilized approach scenarios).

- ✓ Medium term (January 2017- December 2019):

  - ➢ Effective implementation of RST in the most important national aerodromes.

  - ➢ Effective implementation of reactive, proactive and predictive safety processes (FDA) related to runway excursions by general aviation operators.

  - ➢ Feasibility study for the installation of runway excursions prevention systems in aircrafts

- ✓ Long term (January 2020 – December 2022)

  - ➢ Effective implementation of an advanced supervision system for the surveillance of reactive, proactive and predictive systems for the treatment of runway excursions hazards.