International Civil Aviation Organization
CAR/SAM Regional Planning Implementation Group (GREPECAS)
Tenth Meeting of the Aviation Safety Board (ASB/10)
Punta Cana, Dominican Republic, 28 March 2011

Agenda Item 2: Proposal of a new uniform methodology for the identification, assessment and reporting of air navigation deficiencies

PROPOSED REVISED UNIFORM METHODOLOGY FOR THE IDENTIFICATION, ASSESSMENT AND REPORTING OF AIR NAVIGATION DEFICIENCIES FOR THE CAR/SAM REGIONS

(Presented by the Secretariat)

SUMMARY

This working paper presents a proposal for a revised uniform methodology for the identification, assessment and reporting of air navigation deficiencies.

References:

- ACG/8 Report, Mexico City, Mexico, 26 and 27 January 2011.
- Doc 9859 - *Safety Management Manual (SMM)*.

1. Introduction

1.1 The Air Navigation Commission has the responsibility to update the uniform methodology for the identification, assessment and reporting of air navigation deficiencies in light of the experience gained in its application. The latest review of this methodology was carried out in 2001 in light of views of the ALLPIRG/Advisory Group, when the Commission developed a single definition of a *deficiency*, which was approved by the Council on 30 November 2001.

1.2 At that time, the concepts of safety management and the USOAP program were in their early stages. With the current safety risk management processes to improve safety, it is appropriate to revise this methodology and incorporate the contemporary processes and a result based approach.

2. Discussion

Problem Statement

2.1 Some of the shortcomings that justify the need to reengineer the process are:

- GREPECAS Air Navigation Deficiencies Database (GANDD) is out-of-date due to insufficient reporting by States and follow-up by ICAO, IATA and IFALPA.
- There are new tools for the identification and sources for reporting of deficiencies.
- New Safety Intelligence of USOAP and CMA.
- Implementation of SMS (by service providers) and SSP (by States).
- Need for upper management commitment to resolve deficiencies.
- Methodology for assessing and prioritizing deficiencies needs to have upper management accountability.

Deficiencies as hazards

2.2 The role of the ASB is to address safety as its name implies. A deficiency is a situation where a facility, service or procedure does not comply with **a regional air navigation plan approved by the Council, or with related ICAO Standards and Recommended Practices**, and which situation has a negative impact on the safety, regularity and/or efficiency of international civil aviation. A hazard is defined as a condition or an object with the potential to cause injuries to personnel, damage to equipment or structures, loss of material or reduction of ability to perform prescribed function.

Management Systems of Service Providers

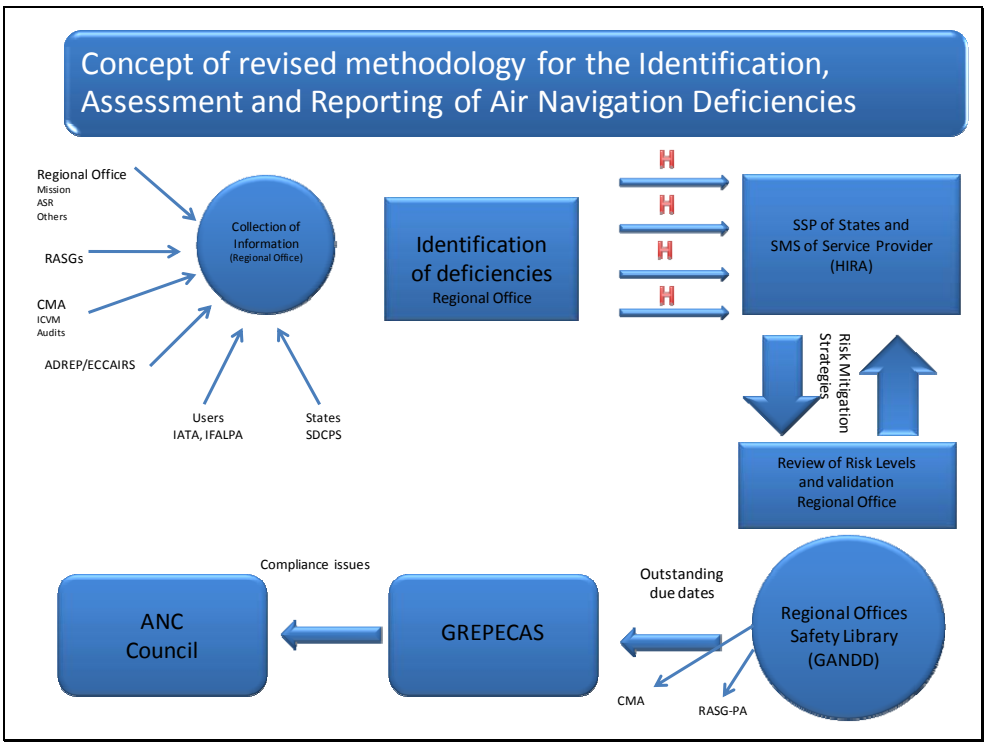
2.3 All service providers are required by ICAO SARPs to either have SMS or QMS, even Annexes which do not have direct provisions for SMS such as CNS are in one way or another covered under the umbrella of an SMS. Therefore a deficiency should be treated as an input into its management system, a safety hazard in the case of an SMS and/or quality degradation in the case of QMS.

2.4 In both cases i.e. SMS or QMS, the service providers are required by regulation to process this input into its management system and to provide an appropriate and effective response to the individual and/or organization informing its concern. The lack of response is clear evidence of lack of effective implementation (LEI) which under the new CMA of ICAO USOAP could increase the risk level of a specific State and trigger the need for an ICAO audit.

2.5 On the other hand, an effective SMS or QMS will address the identified hazard, develop a safety risk analysis and take a decision on the corrective actions with clear accountabilities.

Concept of the revised methodology for the identification, assessment and reporting of Air Navigation Deficiencies

2.6 The following flowchart depicts the concept of the proposed process which will be managed by ICAO ROs, collecting information from different sources, validating the deficiency and informing it as an identified hazard to the respective State where the service provider is located and asking for a hazard identification and risk analysis (HIRA) to be performed.



2.7 The procedure for this new proposed methodology is presented in the **Appendix** to this working paper.

2.8 The Group could note that the ACG/8 Meeting (Mexico City, Mexico, 26 and 27 January 2011), when dealing with Agenda Item 6, examined, improved and endorsedt he methodology, and formulated the following draft conclusion:

DRAFT
CONCLUSION 16/XX **REVISED METHODOLOGY FOR THE IDENTIFICATION, ASSESSMENT AND REPORTING OF AIR NAVIGATION DEFICIENCIES**

That:

a) ICAO consider the proposed revised methodology for the identification, assessment and reporting of air navigation deficiencies presented in the Appendix to this part of the report; and

b) in the interim, GREPECAS adopts the revised methodology as a test bed and informs the ICAO ANC on the results.

3. **Action required:**

3.1 The Group is invited to:

a) note the information presented in this paper, and its Appendix; and

b) based on the deliberations, adopt the draft conclusion submitted under paragraph 2.8.

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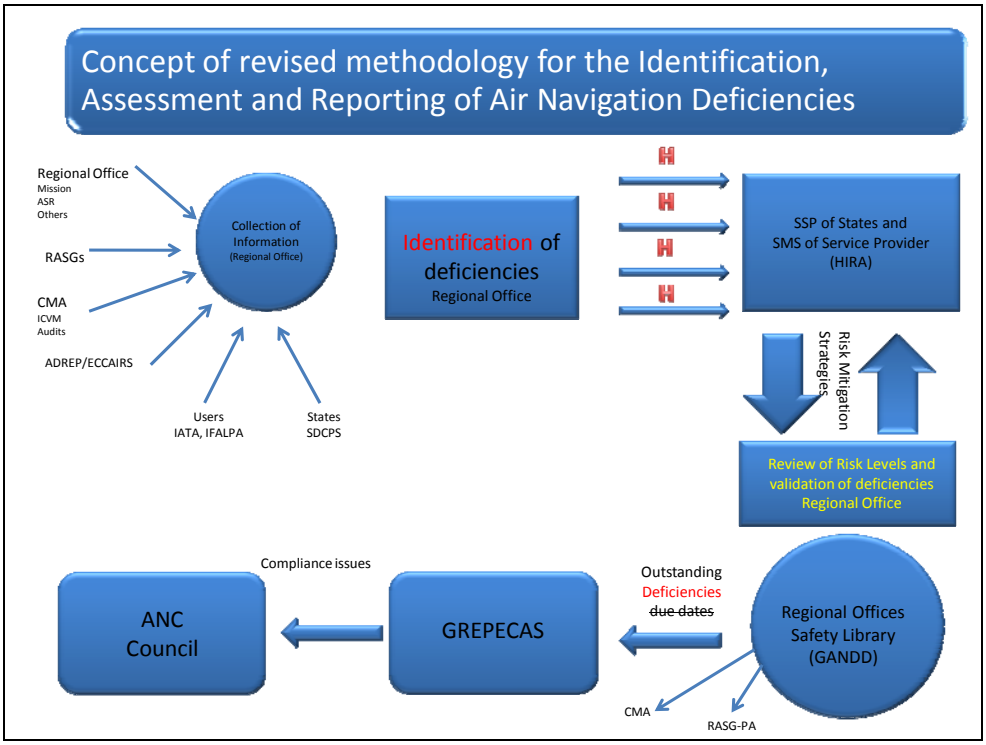
APPENDIX A

PROPOSED REVISED METHODOLOGY FOR THE IDENTIFICATION, ASSESSMENT AND REPORTING OF AIR NAVIGATION DEFICIENCIES CAR/SAM



1. The Regional Office, upon identifying or receiving a report of a deficiency from sources approved by the Council (State/Territory, IATA, and IFALPA), assesses the report and verifies its validity.

2. The deficiency report duly validated by the corresponding Regional Office is sent to the State concerned through the designated focal point, using the Hazard Identification and Risk Assessment (HIRA) Form that appears in **Attachment A** to this procedure.

3. The State enters the deficiency report into its safety system for the corresponding investigation.

4. The State safety system, using its internal procedures, assesses the risk generated by the deficiency and the underlying factors and hazards, expressed in terms of probability and severity:

   a) Determines the risk tolerability index.
   b) Identifies missing or inadequate defences.
   c) Implements mitigation measures to control risk indices or values defined as intolerable, reducing the operational risk to an acceptable level.
   d) Disseminates the information according to its procedures.

5. The State will have three months to return to the corresponding Regional Office the form containing the risk mitigation recommendations report (RMRR) that appears in **Attachment B** to this procedure, duly completed and signed, and will insert a summary of the developed action plan in the GANDD.

   Note: In case of criterion discrepancies in the risk assessment of the reported deficiency/hazard, the corresponding Regional Office could suggest to the State to review the analysis.

6. If no information is received from the State about the reported deficiency within a period of three months, this will be considered as objective evidence of the ineffectiveness of the SSP and/or SMS. This information will be reported to the USOAP/CMA, which could increase the level of risk of this State and activate any of the USOAP/CMA intervention tools.

7. The Regional Office will inform GREPECAS about the result of the risk mitigation assessment and recommendations by the State.

8. Based on the result of the analysis of the deficiency, the information could be sent to the ICAO Air Navigation Commission.

   *Note: **Attachments C** and **D** contain forms, with an example showing how they should be completed.*

9. A statistical report of CAR and SAM deficiencies will be provided to RASG-PA for inclusion in the annual safety report of that mechanism.

   Deficiency: A deficiency is a situation where a facility, service, or procedure does not comply with **a regional air navigation plan approved by the Council, or with related ICAO standards and recommended practices, and which situation has a negative impact on the safety, regularity and/or efficiency of international civil aviation (approved by the Coucil on 30 November 2001).*

   **Hazard: A hazard is a condition or an object with the potential to cause injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function (Doc 9859 para, 4,2,3).*

   Note: Within this context, priority "U" and "A" deficiencies are considered hazards.

ATTACHMENT A TO APPENDIX A

DEFICIENCY (HAZARD) IDENTIFICATION AND RISK ASSESSMENT REPORT	
1. Description of identified deficiency:	
2. State/Territory/Organization:	
3. Report N°:	
4. Date of identification:	
5. Report prepared by:	
6. Air Navigation Area Facility/service involved:	
7. Specific requirement:	
8. Potential consequences of the hazard caused by the deficiency:	
9. Mitigation currently implemented (if known):	
10. Remarks:	
11. Report prepared by: (ICAO Officer)	

DEFICIENCY (HAZARD) IDENTIFICATION AND RISK ASSESSMENT REPORT						
		RISK SEVERITY				
		Catastrophic A	**Hazardous B**	**Major C**	**Minor D**	**Negligible E**
RISK PROBABILITY	**Frequent 5**	***5A***	***5B***	***5C***	***5D***	***5E***
	Occasional 4	***4A***	***4B***	***4C***	***4D***	***4E***
	Remote 3	***3A***	***3B***	***3C***	***3D***	***3E***
	Improbable 2	***2A***	***2B***	***2C***	***2D***	***2E***
	Extremely Improbable 1	***1A***	***1B***	***1C***	***1D***	***1E***

5A, 5B, 5C, 4A, 4B, 3A	**Intolerable region (equivalent to U-priority deficiencies)** Unacceptable under the existing circumstances
5D, 4C, 4D, 3B, 3C, 2A, 2B, 5E, 2C, 4E, 3D	**Tolerable region (equivalent to A-priority deficiencies)** Acceptable based on risk mitigation. It may require management decision.
1A, 1B, 1C, 1D, 1E, 2E, 3E, 2D	**Acceptable region (equivalent to B-priority deficiencies)** Acceptable
Probability	Is defined as the likelihood that an unsafe event or condition might occur
Frequent:	• Likely to occur many times (has occurred frequently)
Occasional:	• Likely to occur sometimes (has occurred infrequently)
Remote:	• Unlikely to occur, but possible (has occurred rarely)
Improbable:	• Very unlikely to occur (not known to have occurred)
Extremely improbable:	• Almost inconceivable that the event will occur
Severity:	Is defined as the possible consequences of an unsafe event or condition, taking as reference the worst foreseeable situation.
Catastrophic	• Equipment destroyed • Multiple deaths
Hazardous	• A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely • Serious injury • Major equipment damage
Major:	• A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of increase in workload, or as a result of conditions impairing their efficiency • Serious incident • Injury to persons
Minor:	• Nuisance • Operating limitations • Use of emergency procedures • Minor incident
Negligible:	• Little consequences

EXPLANATION OF THE "DEFICIENCY (HAZARD) IDENTIFICATION AND RISK ASSESSMENT" FORM

1. **Description of identified deficiency:** Specifies the deficiency identified or the occurrence of the event, validated by the corresponding Regional Office.

2. **State/Territory/Organization:** Identifies the name of the State/Territory/Organization involved.

3. **Report N°:** Identifies the category of the deficiency identified for each State.

4. **Date of identification:** Indicates the DD/MM/YY of the report of the deficiency identified or of the occurrence of the event, as applicable.

5. **Report prepared by:** Indicates the source that identified and reported the deficiency.

6. **Air Navigation Area Facility/service involved or activity:** Specifies the air navigation area directly involved in the identified deficiency. More than one area may be listed.

7. **Potential consequences of the deficiency caused by the deficiency:** Initial assessment of the consequence of the identified deficiency, either by the source reporting the deficiency, or by the Regional Office that sends the report.

8. **Specific requirement:** If known, the specific error or failure that affected the operation is included.

9. **Mitigation currently implemented (if known):** If known, existing defences are included.

10. **Remarks:** Observations or comments on the identified deficiency may be included.

11. **Report prepared by (ICAO Officer):** The reporting ICAO Regional Office is specified.

ATTACHMENT B TO APPENDIX A

RISK MITIGATION RECOMMENDATIONS REPORT				
1. Description of identified deficiency:				
2. State/Territory/Organization:				
3. Report N°:				
4. Date of identification:				
5. Level of risk before mitigation measures are adopted:				
6. Solution # 1				
7. Description of the solution:				
8. Estimated cost and time for implementation of this solution:	**9. Revised risk assessment if only this solution is to be implemented:**	**10.Probability:**		
$		**11. Severity:**		
		12. Level of risk:		
13. Potential implementation problems:				
14. Solution # 2				
15. Description of the solution:				
16. Estimated cost and time for implementation of this solution	**17. Revised risk assessment if only this solution is to be implemented:**	**18.Probability:**		
$		**19. Severity:**		
		20. Level of risk:		
21. Potential implementation problems:				
22. Solution # 3				
23. Description of the solution:				

RISK MITIGATION RECOMMENDATIONS REPORT				
24. Estimated cost and time for implementation of this solution **$** _____	**25. Revised risk assessment if only this solution is to be implemented:**	**26.Probability:**		
		27. Severity:		
		28. Level of risk:		
29. Potential implementation problems:				
30. Recommended solution(s):				
31. Estimated cost and time for implementation of recommended solution(s):	**$**			
32. Revised risk assessment if implemented as recommended:				

		RISK SEVERITY				
		Catastrophic A	**Hazardous B**	**Major C**	**Minor D**	**Negligible E**
RISK PROBABILITY	**Frequent 5**	***5A***	***5B***	***5C***	***5D***	***5E***
	Occasional 4	***4A***	***4B***	***4C***	***4D***	***4E***
	Remote 3	***3A***	***3B***	***3C***	***3D***	***3E***
	Improbable 2	***2A***	***2B***	***2C***	***2D***	***2E***
	Extremely Improbable 1	***1A***	***1B***	***1C***	***1D***	***1E***

33. Report prepared by (State/Territory/Organization):	

EXPLANATION OF THE "RISK MITIGATION RECOMMENDATIONS REPORT"

The State concerned shall complete the form based on the following explanations:

1. **Description of identified deficiency:** Complete with the same text contained in the deficiency or event occurrence report, validated by the corresponding Regional Office.

2. **State/Territory/Organization:** Complete with the name of the State/Territory/Organization.

3. **Report N°:** Complete with the same code of the identified hazard reported by the Regional Office and to which the risk mitigation recommendations refer.

4. **Date of identification:** Complete with the date (DD/MM/YY) of completion of the form.

5. **Level of risk before mitigation measures are adopted:** Complete with the level of risk estimated with the current mitigation measures.

6. **Solution # 1:** Identifies the number of solution.

7. **Description of the solution:** Complete with a brief description of the first solution to be implemented.

8. **Estimated cost and time for implementation of this solution:** Complete with the estimated cost of implementing the first solution.

9. **Revised risk assessment if only this solution is to be implemented:** Associated to boxes 10, 11 and 12.

10. **Probability:** Complete with the coded and plain-language Probability index that would be achieved with the implementation of this mitigation measure.

11. **Severity:** Complete with the coded and plain-language severity index that would be achieved with the implementation of this mitigation measure.

12. **Level of risk:** Complete with the coded and plain-language tolerability index resulting from the implementation of this mitigation measure.

13. **Potential implementation problems:** Complete with a brief description of the potential implementation problems that might prevent the application of the identified solution.

14. **Solution # 2:** Identifies the number of solution or scenario.

15. **Description of the solution:** Complete with a brief description of the second solution to be implemented.

16. **Estimated cost and time for implementation of this solution:** Complete with the estimated cost of implementing the second solution.

17. **Revised risk assessment if only this solution is to be implemented:** Associated to boxes 18, 19, and 20.

18. **Probability:** Complete with the coded and plain-language Probability index that would be achieved with the implementation of this mitigation measure.

19. **Severity:** Complete with the coded and plain-language severity index that would be achieved with the implementation of this mitigation measure.

20. **Level of risk:** Complete with the coded and plain-language tolerability index resulting from the implementation of this mitigation measure.

21. **Potential implementation problems:** Complete with a brief description of the potential implementation problems that might prevent the implementation of the identified solution.

22. **Solution # 3:** Identifies the number of solution or scenario.

23. **Description of the solution:** Complete with a brief description of the third solution to be implemented.

24. **Estimated cost and time for implementation of this solution:** Complete with the estimated cost of implementing the third solution.

25. **Revised risk assessment if only this solution is to be implemented:** Associated to boxes 26, 27 and 28.

26. **Probability:** Complete with the coded and plain-language Probability index that would be achieved with the implementation of this mitigation measure.

27. **Severity:** Complete with the coded and plain-language severity index that would be achieved with the implementation of this mitigation measure.

28. **Level of risk:** Complete with the coded and plain-language tolerability index resulting from the implementation of this mitigation measure.

29. **Potential implementation problems:** Complete with a brief description of the potential implementation problems that might prevent the implementation of the identified solution.

30. **Recommended solution(s):** Complete with the solution(s) to be implemented for reducing the tolerability index to an acceptable level.

31. **Estimated cost and time for implementation of the recommended solution(s):** Complete with the estimated cost of the solutions to be implemented.

32. **Revised risk assessment if implemented as recommended:** Complete with the risk assessment once the solution(s) described above has (have) been implemented.

33. **Report prepared by (State/Territory/Organization):** Complete with the name of the corresponding aeronautical authority or individual or area generating the report.

ATTACHMENT C TO APPENDIX A
COMPLETED FORM

DEFICIENCY (HAZARD) IDENTIFICATION AND RISK ASSESSMENT	
1. Description of identified deficiency:	Lack of English knowledge
2. State/Territory/Organization:	XXXX
3. Report N°:	Name of the State_001/11
4. Date of identification:	8 March 2011
5. Report prepared by:	ATMXXXX mission
6. Air Navigation Area Facility/service involved:	ATM
7. Potential consequences caused by the deficiency:	Comments explaining in detail the conditions under which the incident occurred, such as day, time, aircraft registration, type of aircraft, etc. Potential reduction in safety margins
8. Specific requirement:	Operational error of the ATC in understanding the messages of the pilot in English during radiotelephone communications during taxiing.
9. Mitigation currently implemented (if known):	Courses have been provided on English aeronautical phraseology.
10. Remarks:	The Administration shall take action to resolve this deficiency.
11. Report prepared by: (ICAO Officer)	ICAO XXXX Regional Office

DEFICIENCY (HAZARD) IDENTIFICATION AND RISK ASSESSMENT						
		RISK SEVERITY				
		Catastrophic A	**Hazardous B**	**Major C**	**Minor D**	**Negligible E**
RISK PROBABILITY	**Frequent 5**	***5A***	***5B***	***5C***	***5D***	***5E***
	Occasional 4	***4A***	***4B***	***4C***	***4D***	***4E***
	Remote 3	***3A***	***3B***	***3C***	***3D***	***3E***
	Improbable 2	***2A***	***2B***	***2C***	***2D***	***2E***
	Extremely Improbable 1	***1A***	***1B***	***1C***	***1D***	***1E***

5A, 5B, 5C, 4A, 4B, 3A	**Intolerable region (equivalent to U-priority deficiencies)** Unacceptable under the existing circumstances
5D, 4C, 4D, 3B, 3C, 2A, 2B, 5E, 2C, 4E, 3D	**Tolerable region (equivalent to A-priority deficiencies)** Acceptable based on risk mitigation. It may require management decision.
1A, 1B, 1C, 1D, 1E, 2E, 3E, 2D	**Acceptable region (equivalent to B-priority deficiencies)** Acceptable
Probability	Is defined as the likelihood that an unsafe event or condition might occur
Frequent:	• Likely to occur many times (has occurred frequently)
Occasional:	• Likely to occur sometimes (has occurred infrequently)
Remote:	• Unlikely to occur, but possible (has occurred rarely)
Improbable:	• Very unlikely to occur (not known to have occurred)
Extremely improbable:	• Almost inconceivable that the event will occur
Severity:	Is defined as the possible consequences of an unsafe event or condition, taking as reference the worst foreseeable situation.
Catastrophic	• Equipment destroyed • Multiple deaths
Hazardous	• A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely • Serious injury • Major equipment damage
Major:	• A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of increase in workload, or as a result of conditions impairing their efficiency • Serious incident • Injury to persons
Minor:	• Nuisance • Operating limitations • Use of emergency procedures • Minor incident
Negligible:	• Little consequences

ATTACHMENT D TO APPENDIX A
COMPLETED FORM

<table>
<tr><th colspan="5">RISK MITIGATION RECOMMENDATIONS REPORT</th></tr>
<tr><td>1. Description of identified deficiency:</td><td colspan="4">Lack of English knowledge</td></tr>
<tr><td></td><td colspan="4"></td></tr>
<tr><td>2. State/Territory/Organization:</td><td colspan="4">XXXX</td></tr>
<tr><td>3. Report N°:</td><td colspan="4">Name of the State_001/11</td></tr>
<tr><td>4. Date of identification:</td><td colspan="4">DD/MM/YY</td></tr>
<tr><td>5. Level of risk before mitigation measures are adopted:</td><td colspan="4">4C</td></tr>
<tr><td colspan="5">6. Solution # 1</td></tr>
<tr><td>7. Description of the solution:</td><td colspan="4">Intensive training in English for ATCOs who do not reach ICAO Level 4 and maintenance of language proficiency for ATCOs who have already reached Level 4.</td></tr>
<tr><td rowspan="2">8. Estimated cost and time for implementation of this solution:

$120000</td><td rowspan="3">9. Revised risk assessment if <u>only</u> this solution is to be implemented:</td><td>10. Probability:</td><td>2</td><td>Improbable</td></tr>
<tr><td>11. Severity:</td><td>C</td><td>Major</td></tr>
<tr><td>12. Level of risk:</td><td>2C</td><td>Acceptable, based on risk mitigation</td></tr>
<tr><td>13. Potential implementation problems:</td><td colspan="4">Limited number of ATCOs with ICAO Level-4 English proficiency during the first years of the process, thus hindering the proper completion of shifts.

The personnel training process may take too long.</td></tr>
<tr><td colspan="5">14. Solution # 2</td></tr>
<tr><td>15. Description of the solution:</td><td colspan="4">Amend the ATC unit functions manual to ensure that each shift has at least two ATCOs who are proficient in English at ICAO Level 4 or higher, until all the personnel has reached the proper skill level.</td></tr>
<tr><td rowspan="2">16. Estimated cost and time for implementation of this solution

$ Undetermined</td><td rowspan="3">17. Revised risk assessment if <u>only</u> this solution is to be implemented:</td><td>18.Probability:</td><td>3</td><td>Remote</td></tr>
<tr><td>19. Severity:</td><td>B</td><td>Hazardous</td></tr>
<tr><td>20. Level of risk:</td><td>3B</td><td>Acceptable, based on risk mitigation</td></tr>
<tr><td>21. Potential implementation problems:</td><td colspan="4">It is possible that not all shifts will have sufficient personnel who are proficient in English at ICAO Level 4 or higher.</td></tr>
</table>

RISK MITIGATION RECOMMENDATIONS REPORT				
22. Solution # 3				
23. Description of the solution:	Enhance the training programme in English aeronautical phraseology for operational personnel.			
24. Estimated cost and time for implementation of this solution **$ 30000**	**25. Revised risk assessment if only this solution is to be implemented:**	**26. Probability:**	3	Remote
		27. Severity:	C	Major
		28. Level of risk:	3C	Acceptable, based on risk mitigation
29. Potential implementation problems:	No potential problems have been identified.			
30. Recommended solution(s):	It is recommended that proposed solutions 1 and 3 be implemented to mitigate the risk to an acceptable level, and to amend the documentation for the implementation of solution 2 for a definitive resolution of the deficiency.			
31. Estimated cost and time for implementation of recommended solution(s):	$150,000			
32. Revised risk assessment if implemented as recommended:	Risk level: Improbable – major - 2C			

		RISK SEVERITY				
		Catastrophic A	**Hazardous B**	**Major C**	**Minor D**	**Negligible E**
RISK PROBABILITY	**Frequent 5**	***5A***	***5B***	***5C***	***5D***	***5E***
	Occasional 4	***4A***	***4B***	***4C***	***4D***	***4E***
	Remote 3	***3A***	***3B***	***3C***	***3D***	***3E***
	Improbable 2	***2A***	***2B***	***2C***	***2D***	***2E***
	Extremely Improbable 1	***1A***	***1B***	***1C***	***1D***	***1E***

33. Report prepared by (State/Territory/Organization):	Signature of the competent aeronautical authority

-END -