



DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

Agenda Item 1: Development of proposals, if necessary, for amendments to Annex 18 — *The Safe Transport of Dangerous Goods by Air*

APPLICABILITY OF SMS SARPS

(Presented by SMP WG2)

SUMMARY

Attached is a working paper which will be presented to the Safety Management Panel Working Group of the Whole (SMP/WG/WHL/02) (Montréal, 4 to 8 November 2013).

APPENDIX
APPLICABILITY OF SMS SARPS



SAFETY MANAGEMENT PANEL –WORKING GROUP OF THE WHOLE (SMP/WG/WHL/02)

SECOND MEETING

Montréal, 4-8 November 2013

Agenda Item 2.3.6: Extension of SMS applicability

APPLICABILITY OF SMS SARPS

(Presented by the SMP WG2)

SUMMARY

The ICAO SMP has been tasked to elaborate recommendations related to the possible extension of the SMS framework to additional categories of aviation activities or service providers.

This paper suggests a set of considerations based on which to assess proposals to extend the scope of the Annex 19 SMS framework to additional categories or service providers and/or aviation activities.

These may also be used as guidance for States that would wish to extend SMS SARPs applicability beyond that defined in Annex 19 on a national basis, or to promote voluntary application.

Action by the SMP is in paragraph 3.

REFERENCES

Annex 19, *Safety Management*, 1st Edition
Doc 9859, *Safety Management Manual*, 3rd Edition - 2013
SMP job card (JC) 008 '*Development of amendments to SMS provisions*'
SMP job card (JC) 012 '*Extension of the applicability of the Safety Management System provisions*'.

1. INTRODUCTION

1.1 The ICAO SMP has been tasked to elaborate recommendations related to the possible extension of the SMS framework to additional categories of aviation activities or service providers. This

should be done on the basis of generally applicable parameters.¹ These should focus on the ultimate objective of ensuring the most efficient application of SMS SARPS for hazard identification and risk management. Furthermore, they should be stable enough to be used in the medium and long term, whenever there is a need to consider additional aviation activities and categories of service providers for mandatory application of the SMS framework.

1.2 This task is also relevant in relation to a number of responses to ICAO State Letter AN 8/3-12/42 that suggested extending the applicability of the SMS SARPS as currently envisaged in Annex 19 Edition 1 to include additional categories of services, such as :

- considering the applicability of SMS SARPs to other Annexes, e.g. Dangerous Goods.
- considering whether aircraft ground handling service providers should be required to implement a SMS (JC SMP012).
- ensuring that Flight Training Organisations be required to implement an SMS covering all their training activities, including classroom and on-ground flight instruction, i.e. not only related to those activities entailing the operation of aircraft (JC SMP012).
- reconsidering the applicability in relation to AIS, CNS, MET and/or SAR services with regard to the scope of the ATS service provider's SMS (JC SMP012).
- extending the applicability of the SMS framework in the area of Design and Manufacture to Engines and Propellers (JC SMP008).
- considering whether any other aviation activities or services where there could be an impact on the safe operation of aircraft should be required to implement an SMS (JC SMP012 – for example: instrument flight procedures design).

2. DISCUSSION

2.1 The following considerations are proposed to serve as a basis for SMP recommendations to extend or not SMS applicability for a particular aviation activity or to a particular category of service provider.

2.2 Systems safety (total system approach)

2.2.1 Aviation system 'components' in terms of activities and categories of service providers are part of a single network. Considering aviation safety as an emergent property of this complex socio-technical system², ideally, all providers of aviation services or products (hereafter referred to as 'service providers') that are the target of aviation safety regulations should implement the same basic safety management processes: This would not only ensure interoperability between individual SMS, hence reducing the risk of safety gaps or overlaps and confused responsibilities as related to hazard identification and risk management, but it would also be the most effective way to detect hazards and control their consequences at all levels of the aviation system and at the earliest possible stage. Besides, it

¹ This is in line with the recommendation provided to EU Member States for a reply to ICAO State Letter AN 8/3-12/42 by the European Commission, following which a number of EU States suggested extending the applicability of the SMS framework as envisaged in Annex 19 Edition 1.

² a closely coupled system of systems, with many interdependencies between individuals, organizations and technology.

would ensure that all actors “speak the same language” when it comes to safety and safety management, thus supporting effective implementation.

2.2.2 From a systems safety perspective, as a minimum, activities/categories of service providers of the aviation system at the ‘higher consequence’ level in terms of risk exposure should be considered for a possible SMS ‘mandate’:

- Initial design of aircraft and aircraft components and changes thereto
- Production of aircraft and aircraft components
- Operation of aircraft
- Airspace and air traffic management
- Operation and maintenance of air navigation facilities (including approach facilities)
- Operation and maintenance of aerodromes
- Aircraft continuing airworthiness management and maintenance
- Fitness and competence of aviation personnel (flight crew, cabin crew, technical crew, maintenance engineers, etc...)

2.2.3 Many interfaces and interdependencies exist among these activities/categories of service providers, some being more tightly coupled/connected than others. The degree of coupling or interaction influences the degree of integration required in terms of information flows, management structures and interfaces, as well as the appropriate regulatory control in general, including controls related to effective SMS implementation, in all areas where SMS is already a regulatory requirement. Within each of these aviation system ‘components’ there are also diverse segments of aviation such as commercial air carriers versus general aviation as well as different sizes of the organizations and other entities that operate in the system having their own specific risk profile³. These factors, too, need to be considered when determining the applicability of SMS.

2.2.4 It is evident that there are a number of institutional, regulatory and practical aspects that require due consideration with regards to systems safety (total system approach):

- a) What are the sub-systems that should be considered within the total system (how far to reach out from the front-line or ‘higher consequence’ level)?
- b) How relevant is the performance of the sub-system to the safety of the total system (how strong is the coupling, what is the direct contribution that a hazard within a sub-system may have to an aircraft incident or accident)?
 - For example, design, manufacture, operations and maintenance have the most direct effect on safe aircraft operations; other activities, such as initial flight training contribute to a lesser extent.
- c) How to best cope with the dynamics of the overall system?
- d) Is the service provider within a sub-system in a position to understand their contribution to the safe operation of aircraft?

³ in terms of safety-criticality of the particular type of activities:

- distance of that activity from the top-level (or ‘front line’);
- exposure: types of activity, combination, volume of activity, fleet size;
- complexity of the activities: level of expertise required, number of different entities involved in providing the service (interfaces), scheduled versus un-scheduled frequent changes in type of operations/route network), etc..

- For example, a provider of MET services may only be able to provide a forecast with a defined level of uncertainty, but cannot reasonably perform the actions required by the Annex 19 Appendix 2 SMS framework

2.2.5 Finally, with regards to ensuring the most effective use of limited resources, both at the level of regulators and for industry, practicality of extending SMS applicability versus safety benefits of applying SMS should be evaluated. This should consider that sufficient experience first needs to be gained for those service providers that are required to implement an SMS based on the current provisions.

2.3 Effectiveness of Safety Risk Management (SRM) across service providers

2.3.1 To ensure effective SRM it is first important to ensure effective hazard identification. This relates, on one hand, to the full visibility of all hazards involved with a chain of services and, on the other hand, to the scope and effectiveness of reporting systems being implemented by service providers forming part of the chain.

2.3.2 For example:

- An air operator will not have full visibility of all hazards that may be generated in the context of ground handling services.
- An aircraft design organisation will need to anticipate the future operational conditions of its aircraft design to 'build in' safety.

2.3.3 Another important point to consider for effectiveness of SRM relates to the knowledge and skills required for effective hazard analysis and evaluation of associated risks. Such knowledge and skills may be limited to the service provider's core activities and therefore may be inadequate to also identify hazards and manage risks generated through other parties the service provider interacts with.

2.3.4 For example:

- An aircraft design approval holder may not have the required knowledge to identify hazards and evaluate risks entailed by other safety critical components, e.g. engines, for which it does not hold any design approval.
- An operator that contracts maintenance may not have the required knowledge related to the identification of hazards and evaluation of risks entailed by contracted maintenance activities.

2.3.5 Thirdly, it is important to consider how service providers can ensure effective control to mitigate risks stemming from third parties. This would be primarily through the contractual arrangements between the service provider and its partners/contractors. This may be independent from the applicable regulatory requirements that may foresee a clear separation (e.g. laid down in the organisation's approval) of the different responsibilities and risks originated by each organisations. Ultimately, it must be ensured that accountabilities and responsibilities for the identification of hazards and the management of all associated risks for the entire 'chain' of aviation services within the aviation system are clearly established, without any gaps or overlaps.

2.3.6 For example:

- Can an air operator discharge their operational responsibility for those services that are subject to a separate organisational approval (e.g. maintenance)? Or does the air operator need to also consider under their own SMS hazards and risks entailed by the activities subject to such separate

approval? Is the liability of the operator limited to what constitutes their core activities or should it extend to the services that are provided by entities that are subject to a separate organisational approval?

- How to consider the situation where an air operator, required to implement SMS, contracts maintenance to an organisation not yet required to implement an SMS?
- Does an operator need to consider the hazards and risks entailed by any training activity performed by an independent flight training organisation that is only required to implement an SMS for those activities that entail operation of aircraft?
- Can an aerodrome operator discharge their responsibility for ground handling services considering these are subject to the operational control of the air operators making use of those services?

2.3.7 As a general rule, it should be ensured that whenever a service provider contracts an organisation not itself subject to any SMS requirements the hazards and risks entailed by the activity of that contractor are addressed/covered by the ordering party (the contractor 'working under the SMS' of the ordering party), unless otherwise agreed through contractual arrangements. This implies, however, that the service provider has the necessary knowledge and skills with regards to the activity performed by the contractor. When, on the other hand, the service provider contracts an organisation that is required to implement SMS, then it is for this contracted organisation to address the hazards and risks entailed by its activities. In this case, the ordering party / service provider will be in a position to create an interface with the contractor's SMS, so as to rely on the latter's own capability to properly address specific hazards and risks for the sake of the ordering party/service provider's safety risk management. The applicable requirements should then clearly define the respective responsibilities.

2.3.8 From the perspective of the contractor, the need to work under the SMS of the ordering party may lead to inefficiencies, as the contractor would be subjected to multiple SMS requirements, entailing multiple assessments with potentially inconsistent results. Having their own SMS, accepted by the competent authority, may be preferable in this case, unless 'other party supplier control' systems⁴ are available to the category of service providers that are contracting such services.

2.4 **Practicality of SMS 'implementation'**

2.4.1 Annex 19 defines SMS as a systematic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures. Such organisational structure and capability needs a certain degree of stability to be able to implement SMS. Building upon these considerations it can be assumed that SMS may not be effectively implemented for those activities that do not involve an organisation in the sense of the SMS definition, e.g. where only a limited number of persons are involved and it may be assumed there are frequent changes in personnel involved, thus making it difficult to cope with all SMS processes that are required and consolidate and leverage safety information collected.

2.4.2 For example:

- Non Destructive Testing (NDT) services provided by an individual.
- A general aviation operator mainly consisting of one pilot-owner offering international general aviation services.

⁴ Such systems would allow contractors to rely on some sort of 'certification scheme' through a third party.

2.4.3 Another aspect related to practicality of implementation is the expertise required within the organisation to ensure effective SMS implementation, mainly in terms of providing implementation support, assisting with hazard identification, safety surveys, performing safety investigations, safety studies, implementing safety risk management processes and measuring safety performance. Such expertise will obviously depend on the type of activities, but it can be assumed that the larger the organisation gets and the higher its risk profile is, the more expertise will be required. Service providers that specialise in a particular type of activity, such as providing solely NDT services, on the other hand, may find it difficult to build up SMS related expertise, as they are not directly 'in the front line'. Industry-led initiatives for the development and pooling of specific SMS related tools and procedures may overcome some of these limitations.

2.4.4 Finally, practicality of SMS implementation will also depend on the flexibility of the SMS framework to be applied by a wide range of service providers, with different sizes, complexities, different types of management systems and sometimes industry certification schemes, and different risk profiles. Therefore, the issue of applicability is intrinsically linked with the issue of 'scalability'. To ensure widest possible applicability in line with systems safety (total system approach), the SMS framework should, to start with, be presented in an understandable way, seen from the perspective of the concerned service providers and taking into account their own business model. More particularly, the framework should encourage the implementation of an integrated management system where safety is a parameter to be taken into account with each decision, rather than simply placing SMS on top of an already existing management system (taking a pure business-like approach to managing safety). Likewise, the SMS framework should be exempt of specific features that would be too difficult to be met by all entities within the range of service providers to be covered, because of the cost impact of such provision. Alternatively, the framework should provide for alternative means of compliance for any such feature to specifically address smaller, non-complex organisations.

2.5 Risk control through aviation legislation and operating regulations

2.5.1 The determination of whether or not an activity or category of service provider should be considered for mandating a requirement for an SMS also needs to consider the existence of ICAO standards for a certain activity or category of service provider. This may be in the form of requirements for an organisational approval (e.g. AOC or AMO certificate), which may be complemented or not with additional technical requirements in the form of ICAO SARPs.

2.5.2 For example:

- For some of the suggested candidates for SMS implementation, such as ground handling, there are no ICAO SARPs foreseeing a separate organisation approval. Mandating SMS would then also require the inclusion of SARPs for organisation approval, which will have an impact on States (see Section 2.6 below) and service providers.

2.5.3 Additionally, it should be assessed whether for a certain type of activity compliance with the existing technical requirements adequately addresses the hazards entailed by the activity. This implies that for the activity or category of service provider under consideration all aviation safety hazards have been identified and risks are known, hence these can be fully addressed through common, prescriptive requirements based on ICAO SARPs. In such cases there may be little gain in introducing SRM processes. Depending on the case, it could however be evaluated whether for such activities or categories of service providers some form of management system should be mandated to support these service providers in ensuring compliance with prescriptive standards, rather than mandating a full SMS (see Section 2.1.6.).

2.5.4 Considering the complexity and dynamics of the aviation system, the types of activities and service providers for which prescriptive requirements solely and fully address any possible hazard are assumed to be limited⁵.

2.6 **Oversight**

2.6.1 In having designed SMS as an SSP requirement and thereby mandating it for service providers - as opposed to promoting voluntary implementation - it is essential to evaluate the possible benefits of extending SMS applicability in terms of increased aviation safety against the 'cost' impact on States' oversight capabilities. The latter not only relates to resources in terms of budget and staffing levels, but also to acquiring skills and knowledge required to ensure oversight of SMS implementation and assess SMS effectiveness for a wider range of aviation activities.

2.6.2 Furthermore, States should ideally be able to perform such oversight as part of certification or authorisation processes for the activities or categories of service providers at stake: Imposing an SMS in the absence of an organisation certificate, authorisation or approval may prove to become a challenging exercise, as in such case the overseeing authority of the State may not be in a position take enforcement action, nor to apply any fees, charges or penalties (for example: international general aviation).

2.6.3 Linked to the above it should be evaluated whether it is more appropriate, in terms of efficient safety risk management and effective use of resources, to rely on the State's oversight authority or rather on the service providers to ensure effective SMS implementation at the contractual level. The need for 'mutually' accepted SMS may be an issue here: Can/should the State rely on service providers to 'oversee' SMS implementation for specific services (for example: aerodrome operators for ground handling service providers) without requiring those service providers to implement SMS? There may also be a concern with the mutual acceptance of such 'industry control mechanisms' resulting in multiple contractual requirements on service providers being subject to the acceptance of multiple service providers.

2.7 **'Default' organisational requirements**

2.7.1 Against the above background (2.2 to 2.6), when concluding that a particular activity or category of service provider should not qualify for SMS implementation, it should next be evaluated whether another type of management system⁶, such as quality management systems, could be an alternative.

2.7.2 This may be relevant when compliance with statutory, regulatory and contractual requirements is considered sufficient for ensuring safety of the services provided, either because the hazards and risks entailed by such activities or categories of service provider can be fully addressed by the ordering party or because it can be ascertained that compliance with the existing requirements (regulatory and contractual) already adequately addresses the hazards entailed by the activities or categories of service providers (cf. 2.5).

⁵ It is widely accepted that fewer accidents will be related to broadly distributed exposure factors; accidents and incidents will typically become more "random" in terms of causation, with causes becoming more specific and unique to given operators, aircraft, events, regions, etc...

⁶ e.g. EN9100, or ISO9001

2.7.3 For example:

- Provision of calibration services for test equipment, for which industry standards are mandated as part of contractual requirements.
- Provision of MET services.

2.7.4 This would then need to be reflected in the relevant operating regulations and would obviously then also impact States' oversight capabilities, albeit to a lesser extent than mandating a full SMS.

2.8 **Conclusion**

2.8.1 In summary, SMP WG2 believes that there is a need to agree on a common set of criteria based on which to assess proposals for extension of the SMS framework to additional aviation activities or categories of service providers. These criteria may also be used as guidance for States that would wish to extend SMS SARPs applicability beyond that defined in Annex 19 on a national basis or to promote voluntary application.

3. **ACTION BY THE SMP**

3.1 The SMP is invited to review and agree on:

- a) the general principles developed in this WP to serve as a justification for future SMP recommendations in relation to extending the applicability of the SMS framework beyond what is foreseen in Annex 19 Edition 1;
 - b) the list of applicability criteria and proposed rating as included with Appendix B to this Working Paper; and
 - c) the results of the assessment as included in Appendix A to this Working Paper for the different categories of service providers listed in § 1.2 of this Working Paper.
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APPENDIX A

PROPOSED AMENDMENT TO ANNEX 19

A recommendation is proposed to be added to Annex 19 Chapter 3 as follows:

3.1.5 Recommendation.— As part of its SSP, each State should encourage ground handling services providers under its authority to implement an SMS on a voluntary basis in accordance with the elements contained in Appendix 2.”

Annex 19 Standard 3.1.3. a) is proposed to be amended as follows:

- a) approved training organizations in accordance with Annex 1 ~~that are exposed to safety risks related to aircraft operations during the provision of their services;~~

Annex 19 Standard 4.1.2 is proposed to be amended as follows:

4.1.2 The SMS of an approved training organization, in accordance with Annex 1 ~~that is exposed to safety risks related to aircraft operations during the provision of its services~~ shall be subject to the acceptance of the State(s) responsible for the organization's approval.

APPENDIX B

ASSESSMENT OF EXTENSION CANDIDATES

The below tables provide a qualitative assessment of the applicability criteria supported by a score for each criterion.

The criteria are proposed to be scored on a scale from -1 (contra extending SMS applicability) to + 1 (pro extending SMS applicability) and weighted as below⁷.

Criteria	Specific aspects	Weighting factor
1. Systems safety (total system approach)	<ul style="list-style-type: none"> - High consequence - Degree of interconnectedness (tight coupling, direct contribution of hazard) - Dynamics of the overall system (Ability to manage risk at the higher system level) - Ability of the third party to understand the contribution to the safe operation of aircraft 	1
2. Effectiveness of Safety Risk Management (SRM) across service providers	<ul style="list-style-type: none"> - Ordering party: low visibility of hazards - Contractor: Ability to report safety issues - Contractor: Knowledge and skill to do SRM - Ordering party: Low ability to control risk - Efficiency of contractor SMS versus SMS of ordering party 	1
3. Practicality of SMS ‘implementation’	<ul style="list-style-type: none"> - Cost versus benefit - Necessary organizational structure, accountabilities, policy, procedures - Expertise to ensure SMS implementation - Access to relevant data 	2
4. Risk control through aviation legislation and operating regulations	<ul style="list-style-type: none"> - Existence of a product/service provider certificate, authorization or organization approval in the form of ICAO SARPs 	2

⁷ This weighting considers feedback received from the June 2013 SMP coordination meeting.

	<ul style="list-style-type: none"> - Existence of prescriptive ICAO SARPs addressing the type of activity - 	
5. Oversight	<ul style="list-style-type: none"> - State budget /Staffing Levels - Impact on SSP / safety priorities identified - Skill and knowledge to oversee an SMS - 	2
6. 'Default' organisational requirements *		n/a (no score)

Thus, the possible 'score' may range between two extremes of -8 to + 8. The threshold for recommending SMS applicability is set at + 4.

APPENDIX B.1.- DANGEROUS GOODS			
Consideration	Evaluation		Rating
1. Systems safety (total system approach)	High consequence	'high consequence' aviation activities that call for proper SRM	0
	Degree of interconnectedness (tight coupling, direct contribution of hazard)	Highly interconnected, a hazard at that level can contribute immediately to the safe operation of the aircraft	
	Dynamics of the overall system (Ability to manage risk at the higher system level)	The risks entailed by those activities can be managed more effectively by the air operator.	
	Ability of the third party to understand the contribution to the safe operation of aircraft	Third parties involved in dangerous goods activities may not be in a position to identify hazards.	
	Other considerations		
2. Effectiveness of Safety Risk Management (SRM) across service providers	Ordering party: low visibility of hazards	The air operator should retain full visibility on such hazards.	0
	Contractor: Ability to report safety issues	This should be ensured through contractual arrangements.	
	Contractor: Knowledge and skill to do SRM	The knowledge and skills mainly reside with the air operator	
	Ordering party: Low ability to control risk	The air operator and airport operator must demonstrate ability to control risks associated with these activities as part of their operator responsibilities	
	Efficiency of contractor SMS versus SMS of ordering party	It is more efficient to rely on the air operator to manage the risks entailed by these activities	
	Other considerations		
3. Practicality of SMS	Cost vs benefit	Stand-alone SMS for these providers would	- 1 x 2

APPENDIX B.1.- DANGEROUS GOODS			
‘implementation’		generate significant costs.	
	Necessary organizational structure, accountabilities, policy, procedures	Dangerous goods: organizational structure of the air operators involved.	
	Expertise to ensure SMS implementation	SMS related ‘expertise’ may not yet be available for this type of activity should it be considered as a separate category of services.	
	Access to relevant data	Access to safety data may be a problem	
	Other considerations		
4. Risk control through aviation legislation and operating regulations	Existence of a product/service provider certificate, authorization or organization approval in the form of ICAO SARPs	There are no ICAO SARPs mandating a stand-alone organization approval for the activities under consideration.	0
	Existence of prescriptive ICAO SARPs addressing the type of activity	States are required by Annex 18 to have inspection and enforcement procedures to ensure that dangerous goods are being carried in compliance with the requirements.	
	Other considerations		
5. Oversight	State budget /Staffing Levels	Currently, the transport of dangerous goods is overseen as part of the oversight of air operators and risks entailed by these activities are to be managed under the operators’ SMS (see also Annex 18 Chapter 8 ‘Operator’s responsibilities’). Considering these types of service providers for a stand-alone SMS would entail inefficient use of regulator resources.	-1 x 2
	Impact on SSP / safety priorities identified		
	Skill and knowledge to oversee an SMS		
	Other considerations		
6. ‘Default’ organisational requirements *		This would not be appropriate as the risks entailed by such activities can be more adequately managed at operator level.	

APPENDIX B.1.- DANGEROUS GOODS

Overall assessment

Score= 0 + 0 - 2 + 0 - 2 = - 4

It is not appropriate to single out these activities, as the risks entailed may be more adequately managed at air operator level.
It is therefore proposed not to recommend the extension of the SMS applicability to dangerous goods.

APPENDIX B.2.- INSTRUMENT FLIGHT PROCEDURES DESIGN			
Consideration	Evaluation		Rating
1. Systems safety (total system approach)	High consequence	'high consequence' aviation activities that call for proper SRM	0
	Degree of interconnectedness (tight coupling, direct contribution of hazard)	Highly interconnected, a hazard at that level can contribute immediately to the safe operation of the aircraft	
	Dynamics of the overall system (Ability to manage risk at the higher system level)	The risks entailed by those activities can be managed more effectively by the ANSP.	
	Ability of the third party to understand the contribution to the safe operation of aircraft	Third parties involved in the design of instrument flight procedures may not be in a position to identify hazards.	
	Other considerations		
2. Effectiveness of Safety Risk Management (SRM) across service providers	Ordering party: low visibility of hazards	ANSP should retain full visibility on such hazards.	0
	Contractor: Ability to report safety issues	This should be ensured through contractual arrangements.	
	Contractor: Knowledge and skill to do SRM	The knowledge and skills mainly reside with the ANSP.	
	Ordering party: Low ability to control risk	The air operator must demonstrate ability to control risks associated with these activities as part of their operator responsibilities	
	Efficiency of contractor SMS versus SMS of ordering party	It is more efficient to rely on the ANSP to manage the risks entailed by these activities	
	Other considerations		
3. Practicality of SMS 'implementation'	Cost vs benefit	Stand-alone SMS for these providers would generate significant costs. The risks entailed by the design of instrument flight procedures need to be	- 1 x 2

APPENDIX B.2.- INSTRUMENT FLIGHT PROCEDURES DESIGN			
		managed by the organization having full visibility on airspace design and navigation procedures.	
	Necessary organizational structure, accountabilities, policy, procedures	Instrument flight procedures design: this does not per se require an organization approval.	
	Expertise to ensure SMS implementation	SMS related 'expertise' for such services is available within ANSPs.	
	Access to relevant data	Access to such safety data would be problematic if the service was singled out in terms of SMS implementation due to a lack of visibility on system safety.	
	Other considerations		
4. Risk control through aviation legislation and operating regulations	Existence of a product/service provider certificate, authorization or organization approval in the form of ICAO SARPs.	There are no ICAO SARPs mandating a stand-alone organization approval for the provision of services under consideration. Also, there is no 'certification scheme' for the design of instrument flight procedures.	-1 x 2
	Existence of prescriptive ICAO SARPs addressing the type of activity	Procedures for Air Navigation Services OPS - Aircraft Operations (Doc 8168) Volume II contains details on the construction of Visual and Instrument Flight Procedures. The existing SARPs are addressing the specific risks entailed by the design of instrument flight procedures.	
	Other considerations		
5. Oversight	State budget /Staffing Levels	Currently, the design of instrument flight procedures is overseen as part of the oversight of ANSPs. Therefore, specific skills and knowledge pertaining to these services are already present within	-1
	Impact on SSP / safety priorities identified		
	Skill and knowledge to oversee an SMS		

APPENDIX B.2.- INSTRUMENT FLIGHT PROCEDURES DESIGN			
		regulators. However, considering this type of service for a stand-alone SMS in addition to the oversight of ANSPs would require additional resources (without safety benefit).	
	Other considerations		
6. 'Default' organizational requirements *		This would not be appropriate as the organizations under consideration are already addressed in ICAO Annex 11 and Annex 19.	
<p>Overall assessment</p> <p>Score= 0 + 0 - 2 -2 - 1 = - 5</p> <p>It is not appropriate to single out these activities, as the risks entailed may be more adequately managed at ANSP level. It is therefore proposed not to recommend the extension of the SMS applicability to the design of instrument flight procedures. :</p>			

APPENDIX B.3. - GROUNG HANDLING SERVICE PROVIDERS			
Consideration	Evaluation		Rating
1. Systems safety (total system approach)	High consequence	Not a 'high consequence' aviation activity; however, activities are safety critical.	1 x 1
	Degree of interconnectedness (tight coupling, direct contribution of hazard)	Highly interconnected, a hazard at that level can contribute immediately to the safe operation of the aircraft	
	Dynamics of the overall system (Ability to manage risk at the higher system level)	Are air operators in the best position to identify hazards and manage risks related to ground handling? It will not always be the case . For example: the Pilot in Command may not identify a loading hazard. Dynamics: ground handlers take over more and more responsibilities	
	Ability of the third party to understand the contribution to the safe operation of aircraft	Ground Handling service providers may be certificated under IATA's ISAGO (IATA Safety Audit for Ground Operations, a commercial, quality standards. Could the quality standard be a basis for a better understanding of safety?	
	Other considerations		
2. Effectiveness of Safety Risk Management (SRM) across service providers	Ordering party: low visibility of hazards	Do operators fully assume their operational responsibilities with regards to ground handling? Operational hazards by ground handling may have to be assessed in real time by the Pilot in Command. Time may not allow it.	1 x 1
	Contractor: Ability to report safety issues	It is not obvious at this stage that ground handlers may develop such ability	
	Contractor: Knowledge and skill to do SRM	as above	
	Ordering party: Low ability to control risk	Weak; Number of operator staff (the Pilot in Command, the Co pilot) involved during real time operations for e.g. a turnaround	

APPENDIX B.3. - GROUND HANDLING SERVICE PROVIDERS			
	Efficiency of contractor SMS versus SMS of ordering party	The ground handlers would be involved in so many ordering parties' SMS' that it may be more efficient that they implement their own SMS	
	Other considerations	Operators involved in many different airports would have to oversee many SMS if the ground handler is not required to have an own SMS	
3. Practicality of SMS 'implementation'	Cost vs benefit	Initial costs to implement SMS may be offset by a reduction in 'oversight' by multiple ordering parties and by efficiency gains.	1 x 2
	Necessary organizational structure, accountabilities, policy, procedures	Although there are no ICAO SARPs requiring a certificate for this type of activity, the good industry practice is that Ground handlers are "certificated" under the ISAGO scheme developed by IATA. The required organizational structure may exist within that scheme	
	Expertise to ensure SMS implementation	SMS related 'expertise' may not yet be available for this type of activity	
	Access to relevant data	Access to safety data may be a problem	
	Other considerations		
4. Risk control through aviation legislation and operating regulations	Existence of a product/service provider certificate, authorization or organization approval in the form of ICAO SARPs.	Currently, there is no specific organization approval foreseen in ICAO SARPs for the provision of ground handling.	- 1 x 2
	Existence of prescriptive ICAO SARPs addressing the type of activity	Currently, the technical standards are contained in multiple annexes. These may however require a review to determine whether any specific hazards are sufficiently addressed before determining the need for an organization approval and at some stage an SMS.	
	Other considerations	Industry standards exist: ISAGO is a widely used scheme like IOSA and it is used by	

APPENDIX B.3. - GROUNG HANDLING SERVICE PROVIDERS			
		many airlines	
5. Oversight	State budget /Staffing Levels	Additional resources would be required, but there would also be a 'shift' in oversight resources, as with the current provisions ground handling needs to be overseen as part of the oversight of each operator (the overall impact on oversight resources could finally be positive)	-1 x 2
	Impact on SSP / safety priorities identified		
	Skill and knowledge to oversee an SMS	Currently ground handling is overseen as part of the oversight of air operators, so it may be assumed the skills and knowledge are present	
	Existence of a product/service provider certificate, authorization or approval	Currently, there is no specific approval foreseen for this activity and technical standards are contained in multiple annexes.	
	Other considerations	Equivalency should not be a primary issue. In certain cases ground handling providers may be in a monopoly position which may not be effectively controlled by relying only on the 'oversight' exercised by the users of their services.	
6. 'Default' organisational requirements *		As an intermediate step towards full SMS, implementation of quality management type of systems should be promoted and this may consider ISAGO standards .	
Overall assessment			
Score= 1 + 1 + 2 - 2 - 2 = 0			
<p>Clear benefits could be expected from requiring ground handling service providers to have their own SMS, both in terms of effective mitigation of aviation risks they introduce and of preventing multiple operator auditing on these providers. Also, it would not be practical to let the aerodrome operator take responsibility for ground handling risks under their own SMS, as this may conflict with freedom of enterprise legislation, contractual arrangements and business models being applied.</p> <p>However, there is currently no type of organization approval foreseen for this category of service providers in the ICAO SARPs and there are no consolidating technical standards for the provision of ground handling services (SARPs). It may be difficult to achieve consensus on the need for such changes at the level of ICAO SARPs.</p>			

APPENDIX B.3. - GROUND HANDLING SERVICE PROVIDERS

It is therefore proposed to recommend SMS implementation, as follows:

3.1.5 Recommendation.— As part of its SSP, each State should encourage ground handling services providers under its authority to implement an SMS on a voluntary basis in accordance with the elements contained in Appendix 2.”

APPENDIX B.4. - APPROVED TRAINING ORGANISATIONS, INCLUDING CLASSROOM AND ON-GROUND FLIGHT INSTRUCTION			
Consideration	Evaluation		Rating
1. Systems safety (total system approach)	High consequence	The results of inadequate classroom and ground training, assessment and examination standards may go undetected for a very long time, but these may lead to or contribute significantly to serious or fatal events. According to some sources ⁸ only a small percentage of all human errors are assumed to be 'knowledge-based errors', but as only a small percentage of these errors can be detected and corrected, the real percentage may be much higher.	1 x 1
	Degree of interconnectedness (tight coupling, direct contribution of hazard)		
	Dynamics of the overall system (Ability to manage risk at the higher system level)	Specific training related hazards may not be managed effectively at the level of air operators alone.	
	Ability of the ATO to understand the contribution to the safe operation of aircraft		
	Other considerations	Requiring all ATOs to implement SMS would be more effective to detect hazards and control their consequences at all levels of the aviation system and at the earliest possible stage.	
2. Effectiveness of Safety Risk Management (SRM) across service providers	Ordering party (Operator): low visibility of hazards & low ability to control risk	Air operators have very little visibility on specific hazards entailed by classroom and ground flight instruction.	1 x 1
	Contractor (ATO): Ability to report safety issues & knowledge and skills to do SRM	All ATOs should have in place reporting systems and should have SRM knowledge and skills, regardless of the type of	

⁸ E.g. 'Human Error', James Reason, Cambridge University Press, 1990

APPENDIX B.4. - APROVED TRAINING ORGANISATIONS, INCLUDING CLASSROOM AND ON-GROUND FLIGHT INSTRUCTION			
		training.	
	Efficiency of contractor SMS versus SMS of ordering party	Considering the specifics of flight training it is more efficient to ensure all training related hazards are addressed under the SMS of the ATO and this should cover the entire range of training activities, not only flight training.	
	Other considerations		
3. Practicality of SMS 'implementation'	Cost vs. benefit	The number of ATOs only providing classroom or ground training is expected to be limited. Those ATOs already required to implement an SMS as per A 19 would simply need to extend their SMS to cover all activities.	1 x 2
	Necessary organizational structure, accountabilities, policy, procedures	ATOs are already required to demonstrate organizational capabilities as per ICAO Annex 1 SARPs.	
	Expertise to ensure SMS implementation	Those ATOs already required to implement an SMS as per A 19 must have acquired this already. ATOs only providing classroom or ground training would need to develop their knowledge and skills.	
	Access to relevant data	Currently, safety data will mainly stem from incidents and accidents during flight training. Ensuring that all ATOs implement an SMS would allow collecting safety data also in relation to classroom or ground training.	
	Other considerations	Ensuring that all ATOs implement an SMS would also contribute to promoting a	

APPENDIX B.4. - APROVED TRAINING ORGANISATIONS, INCLUDING CLASSROOM AND ON-GROUND FLIGHT INSTRUCTION			
		positive safety culture throughout the whole chain of service providers and aviation professionals.	
4. Risk control through aviation legislation and operating regulations	Existence of a product/service provider certificate, authorization or organization approval in the form of ICAO SARPs.	ICAO Annex 1 requires flight training organizations to be approved.	0
	Existence of prescriptive ICAO SARPs addressing the type of activity	ICAO Annex 1 defines all technical rules, these may not sufficiently address organizational hazards.	
	Other considerations		
5. Oversight	State budget /Staffing Levels	All ATOs are subject to State oversight. The impact on resources would be limited to assessing SMS for classroom and ground training activities as part of the existing oversight programme. Requiring all ATOs, regardless of the type of training, to implement SMS would allow standardisation in ATO oversight and is expected to have a positive impact on resources.	1 x 2
	Impact on SSP / safety priorities identified		
	Skill and knowledge to oversee an SMS	Considering A.19 Standard 4.1.2 ATO specific knowledge and skills with regards to SMS implementation need to be developed in all cases.	
	Other considerations	General applicability of SMS for all ATOs may enhance mutual recognition of organisation certificates and related training certificates/licences.	
6. 'Default' organisational requirements *		n/a	

APPENDIX B.4. - APPROVED TRAINING ORGANISATIONS, INCLUDING CLASSROOM AND ON-GROUND FLIGHT INSTRUCTION

Overall assessment:

Score= 1 + 1 + 2 + 0 + 2= 6

Considering the above assessment benefits may be expected from requiring all ATOs to implement an SMS both in terms of systems safety and equivalency. It is therefore recommended to amend A19 Standard 4.1.2 to include all ATOs, regardless of the type of training provided.

APPENDIX B.5. - DESIGN AND MANUFACTURE OF ENGINES AND PROPELLERS			
Consideration	Evaluation		Rating
1. Systems safety (total system approach)	High consequence	<p>Level of the aviation system: considered part of 'high consequence' aviation activity because of the possible consequences of risks in design and manufacturing</p> <p>Engines and propellers (design and manufacturing) present a number of the risks to overall safe aircraft behaviour. Some of these are mitigated through aircraft systems and duplication, but a small number of risks are managed by the engine/propeller designer/manufacturer. Risks are managed through both design and manufacturing controls.</p>	1
	Degree of interconnectedness (tight coupling)	Aircraft and their engines and propellers are clearly connected, in that the design of one relies on the design of the other. Risks in one design may be mitigated in the other, and therefore the contribution of the design/manufacturer of engines/propellers is interconnected with that of the airframer.	
	Ability to determine risk at the higher system level	<p>While a common definition of risk/hazard is required, we should consider two possibilities.</p> <p>1. Risks inherent in the product, where the product may fail to perform correctly, and imperil an aircraft. Risks of this nature are identified through design analysis by the engine/propeller manufacturer, and there is already a mature dialogue with the airframer as part of his design analysis.</p> <p>2. We may also consider 'softer' risks, where individuals may make mistakes, leading to an inadequate design, or a non-conforming product. The aircraft manufacturer is unlikely to have the capability to assess the robustness of the engine/propeller manufacturer's systems at a product level, since he neither has the detailed design/manufacturing visibility of the potential for such risks, nor has visibility of the product's tolerance to the risk.</p>	
	Other considerations		

APPENDIX B.5. - DESIGN AND MANUFACTURE OF ENGINES AND PROPELLERS			
2. Effectiveness of Safety Risk Management (SRM) across service providers	Visibility of hazards	See note on the definition of risks/hazards above. The engine/propeller manufacturer is in a position to determine risks/hazards related to the operation of the engine/propeller, and is able to mitigate them, or agree mitigation with the airframer.	1
	Ability to report safety issues	As Type Certificate holders, engine and propeller manufacturers are currently obliged to report potential safety issues to the State of Design. In some States, these include items where risk is considered too great, but no event has occurred. Reporting mechanisms for items of significance are normally in place between airframers and engine/propeller manufacturers.	
	Knowledge and skill to do SRM	The airframe TC holder may not be in a position to properly identify, assess and evaluate risks that are entailed by the design/ manufacture of engines and propellers. Engine and propeller manufacturers are aware of the risks in their operation, and are already required to analyse and reduce risks by design. There is normally a requirement to pass residual product safety risks to the airframer.	
	Ability to control risk	Design risks are already required to be controlled by the TC applicant through the type certification process – this duty is currently split between all TC holders (aircraft, engines and propellers).	
	Other considerations		
3. Practicality of SMS ‘implementation’	Cost vs benefit	If we presume that SMS contains many of the disciplines currently required of TC holders, the benefit of its introduction is incremental. The cost of not following the existing worksplit between TC holders is to introduce duplication, and consequently raise the cost to industry (and regulators).	1 x 2
	Necessary organizational structure,	Not all States award Type Certificates based on an organisational approval. This is true of aircraft TCs as well as	

APPENDIX B.5. - DESIGN AND MANUFACTURE OF ENGINES AND PROPELLERS			
	accountabilities, policy, procedures	E&P TCs. The responsibility to introduce necessary organisation structures would be placed solely on the airframer under the current Annex 19 provisions. Extension to engines and propellers would allow these organisations to offer their own existing organisational structures, where they exist to satisfy existing State requirements.	
	Expertise to ensure SMS implementation	Within industry, the necessary expertise is contained in engine/propeller manufacturers for those items, rather than in the airframer.	
	Access to relevant data	TC holders are obliged to collect data to determine the potential for safety concerns in the product's operation. Currently data is provided as required by State of design at engine/propeller level. Note that manufacturing operations do not have the same level of access to service data, but this is true of both aircraft and engine/propeller manufacturing.	
	Other considerations		
4. Risk control through aviation legislation and operating regulations	Existence of a product/service provider certificate, authorization or organization approval in the form of ICAO SARPs.	Where States have such a requirement, it applies to all TC holders. This is the case for example for all TC holders in the EASA system..	1 x 2
	Existence of prescriptive ICAO SARPs addressing the type of activity	The current SARPs for SMS apply to engine and propeller design and manufacture (as part of the aircraft); however the responsibility for this is placed solely with the aircraft manufacturer, rather than with the engine and propeller manufacturers. Certification requirements for engines and propellers are already in place, and are a separate activity from aircraft certification, recognised in Annex 8. These requirements do not address organizational hazards, however, many States already require an organisational approval for type certificate holders, which includes those	

APPENDIX B.5. - DESIGN AND MANUFACTURE OF ENGINES AND PROPELLERS			
		holding type certificates for engines and propellers.	
	Other considerations		
5. Oversight	State budget /Staffing Levels	<i>Oversight may be duplicated unless engines and propellers are separated from aircraft. Expertise not normally held by the State may need to be developed (see below).</i>	1 x 2
	Impact on SSP / safety priorities identified		
	Skill and knowledge to oversee an SMS	<i>Retained in States of Design and Manufacture. It is therefore necessary to ensure that the State of Design and State of Manufacture responsibilities are clearly defined in Annex 8, where currently conventions are applied by industry. This requires a parallel change to Annex 8.</i>	
	Other considerations	<i>In many contracting States a separate TC is issued for engines and propellers.</i> <i>See note regarding organisational approvals in 2.3</i>	
6. 'Default' organisational requirements *	As an intermediate step towards full SMS, a quality management type of system should be required.		
<p>Overall assessment:</p> <p>Score= 1 + 1 + 2 + 2 + 2 = 8</p> <p>Considering the above considerations on expected benefits and current practice with regards to type certification it is recommended to extend SMS applicability to include service providers for design and manufacture of engines and propellers.</p>			