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Feasibility Study of a Hazard Identification Process on Daily Operations of a National Airline Operator – euroAtlantic Airways

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Resumo

Desde o seu início como atividade comercial, a indústria da aviação experimentou uma série de mudanças em termos de segurança operacional. Atualmente, reconhece-se que a aviação é um mosaico complexo constituído por fatores humanos, técnicos, ambientais e organizacionais, que se interrelacionam entre si e afetam a segurança e o desempenho de todo o sistema. Por esta razão, os operadores aéreos precisam identificar todos os perigos que podem afetar suas operações.

Neste trabalho desenvolve-se o estudo de viabilidade da implementação de uma Lista de Identificação de Perigos habilitando à tomada de decisão operacional no operador de linha aérea nacional – euroAtlantic Airways (EAA).

Em 2017, o Departamento de Safety da EAA realizou uma pesquisa, junto de várias entidades reguladoras e de outros operadores aéreos, e compilou numa lista 142 perigos operacionais da companhia. Com a continuidade da operação, houve a necessidade de organizar e completar esta lista de forma a melhorar a assistência da tomada da decisão nas operações diárias do operador.

Para tal foi realizada uma pesquisa bibliográfica sobre modelos de identificação de perigos, sistemas de gestão de segurança operacional e sistemas de gestão de risco. Posteriormente, recorrendo à informação disponível no sistema interno da companhia para reporte de ocorrências, foi feita uma análise de cada um dos reportes de forma a identificar quais os perigos a que a companhia tinha sido sujeita nos últimos 5 anos. A informação obtida desta análise foi cruzada com a informação contida na listagem de perigos realizada em 2017, dando origem a uma nova Lista de Identificação de Perigos dividida em 5 categorias: organização, fatores humanos, meio/ambiente, fatores técnicos e operação.

A validação dos resultados obtidos foi realizada em dois níveis distintos: a nível interno da companhia, pelo Safety Manager da EAA, e a nível externo, em auditoria IOSA.

Palavras-chave

Segurança Operacional, Identificação de Perigos, euroAtlantic Airways, Sistema de Gestão de Segurança Operacional, IQSMS, Análise de Risco

Resumo Alargado

Introdução

Este resumo alargado pretende expor de uma forma concisa o enquadramento desta dissertação e os objetivos que se pretendem atingir com a realização da mesma. São também referidos os aspetos mais relevantes do caso de estudo, as principais conclusões retiradas durante o seu desenvolvimento e as perspetivas de trabalhos futuros.

Enquadramento da Dissertação

Nos dias de hoje, várias entidades reguladoras e autoridades aeronáuticas, como a ICAO e a EASA, reconhecem a importância de os operadores conhecerem os riscos associados a todas as suas operações. Como membro da IATA com certificado IOSA, a euroAtlantic Airways (EAA) tem de assegurar que controla o máximo de perigos envolvidos nas suas operações.

Em 2017 a EAA começou a desenvolver uma Lista de Identificação de Perigos. Esta primeira versão do documento foi redigida com informação recolhida junto de várias entidades reguladoras da aviação civil e de Departamentos de Segurança Operacional de outros operadores. Este documento estava estruturado de um uma forma muito simples: duas páginas com as matrizes de risco, seguidas por 12 páginas onde se identificavam 142 perigos, divididos em cinco categorias.

Todos os perigos tinham uma análise de risco e a maioria tinha também medidas de mitigação já associadas. No entanto esta lista só comtemplava perigos gerais e comuns a todos os operadores aéreos, sem considerar perigos específicos associados às diferentes operações da EAA.

Objetivos

O objetivo desta dissertação é estudar a viabilidade de criar uma Lista de Identificação de Perigos fácil de usar numa base diária e capaz de assistir na tomada de decisões operacionais na EAA.

Em particular, este trabalho centra-se na melhoria de uma Lista de Identificação de Perigos já existente através da análise dos reportes efetuados durante os últimos quatro anos de operações, a fim de melhorar o planeamento das operações e, consequentemente, a segurança das mesmas.

Caso de Estudo

Numa primeira fase foi necessário desenvolver um estudo sobre a organização interna da empresa, com especial foco no Departamento de Segurança Operacional. Para tal o Manual da Organização e o Manual de Gestão de Segurança Operacional foram consultados e utilizados como principais guias para a restruturação do documento.

Foi também realizada uma pesquisa bibliográfica sobre modelos de identificação de perigos, sistemas de gestão de segurança operacional e sistemas de gestão de risco, que ajudou na organização da informação e no tratamento dos dados recolhidos.

Posteriormente, recorrendo à informação disponível no sistema interno da companhia para reporte de ocorrências, foi feita uma análise de cada um dos reportes de forma a identificar quais os perigos a que a companhia tinha sido sujeita nos últimos 5 anos. Esta informação deu origem a uma nova Lista de Identificação de Perigos dividida em 5 categorias: organização, fatores humanos, meio/ambiente, fatores técnicos e operação.

Cada um destes 5 grupos foi dividido em subáreas cuja numeração e o título não se repetem dentro do grupo ao qual pertencem. Estes títulos foram definidos com a colaboração dos vários Representantes de Segurança Operacional, que a EAA tem distribuídos pelos vários departamentos, e tendo em conta o tema comum entre os vários perigos que neles são abordados. Cada perigo foi individualmente identificado com um número de série.

Após a identificação dos vários perigos, os mesmos foram sujeitos a uma análise de risco inicial. Para esta análise foram utilizadas matrizes da EAA e do IQSMS para avaliar cada um dos perigos em termos de probabilidade de ocorrência e severidade das consequências.

Nesta fase também se procedeu ao cruzamento dos novos dados com a informação já existente na primeira versão da Lista de Identificação de Perigos. Desta forma o processo para documentação e implementação de medidas de mitigação foi agilizado.

Os resultados obtidos foram validados a nível interno na EAA pelo Gestor de Segurança Operacional e, a nível externo, através da auditoria IOSA. Este último nível de validação foi crucial, não só para a dissertação, como para a EAA assegurar conformidade para com os requisitos da certificação IOSA.

Principais Conclusões

Para facilitar a transição da Lista de Identificação de Perigos de 2017 para a nova lista, optou-se por manter 5 grupos de perigos principais. No entanto, de forma a facilitar a identificação de perigos e tornar a lista mais fácil de utilizar no dia a dia das operações, foram introduzidas duas novas características:

1. Sistema de Subáreas: facilita o processo de procura por um perigo específico uma vez que cada Grupo de Perigo se encontra agora organizados por temas mais específicos;
2. Número de Série: permite de forma rápida e prática catalogar e identificar cada um dos perigos individualmente. Isto permite à empresa manter um registo completo de todos os perigos operacionais, mesmo quando estes se aplicam a tipos de operação não tão comuns.

Esta nova Lista de Identificação de perigos permite também relacionar os perigos com os reportes do IQSMS. Esta característica permite ao Departamento de Segurança Operacional da EAA a acompanhar o desenvolvimento da probabilidade de risco de cada um dos perigos identificados e a eficiência das medidas de mitigação.

A presente dissertação permitiu uma análise mais detalhada dos reportes realizados na EAA entre janeiro de 2015 e março de 2019. Através desta análise é possível verificar que a maioria dos reportes pertencem aos grupos de perigos Operacionais e perigos Técnicos.

Perspetivas de Investigação Futuras

Esta dissertação apenas considera os dados disponíveis no Sistema de Reportes do IQSMS da EAA e a primeira versão da Lista de Identificação de Perigos de 2017. De forma a melhorar a recolha de dados sugere-se a implementação de métodos preditivos.

Os reportes feitos no IQSMS devem continuar a ser analisados de forma a manter a probabilidade de risco de cada evento atualizada e verificar a eficiência das medidas de mitigação implementadas.

A lista pode também ser melhorada através de uma reanálise dos perigos com maior número de reportes associados, com objetivo de averiguar a vantagem de subdividir esses perigos inicialmente identificados em perigos mais específicos.

Abstract

Since its beginning has a commercial activity, the aviation industry has experienced a lot of changes in terms of safety. Nowadays it is recognized that aviation is a complex mosaic of interrelated human, technical, environmental, and organizational factors that affect safety and system performance. For this reason, air operators need to identify all the hazards that may affect their operations.

This work develops the feasibility study of the implementation of a hazard identification list enabling operational decision-making in the national airline operator – euroAtlantic Airways (EAA).

In 2017, EAA Safety Department consulted various regulators and other air operators and compiled a list of 142 operational hazards of the company. With the continuity of the operation, there was a need to organize and complete this list in order to improve the assistance of decision making in the daily operations of the operator.

In order to do so, bibliographic research on hazard identification processes, safety risk system and safety risk management was performed. Later, using the information available in the company's internal occurrence reporting system, an analysis of the reports was made in order to identify which hazards the company had been subjected to in the last 5 years. The information obtained was then cross-checked with the information contained in the hazard list held in 2017, creating a new Hazard Identification Log divided into 5 categories: organization, human factors, environment, technical and operation.

The results were validated at two different levels: at the company's internal level, by EAA Safety Manager, and at an external level, under IOSA external audit.

Keywords

Safety, Hazard Identification, euroAtlantic Airways, Safety Management System, IQSMS, Risk Assessment

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Acronyms List

ACMI	Aircraft, Crew, Maintenance and Insurance
ALARP	As Low As Reasonably Practicable
ANAC	Autoridade Nacional de Aviação Civil
ANSP	Air Navigation Services Provider
AOC	Air Operator Certificate
ASQS	Advanced Safety and Quality Solutions
ATS	Air Traffic Services
CASA	Civil Aviation Safety Authority
CRM	Crew Resource Management
EAA	euroAtlantic Airways
EASA	European Aviation Safety Agency
ECAST	European Commercial Aviation Safety Team
FAA	Federal Aviation Administration
FAOC	Foreign Air Operator Certificate
FAR	Federal Aviation Regulation
GPIAAF	Gabinete de Prevenção e Investigação de Acidentes com Aeronaves e Acidentes Ferroviários
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IOSA	IATA Safety Operational Audit
IQSMS	Integrated Quality and Safety Management System
ISARP	IOSA Standards And Recommended Practices
MRO	Maintenance Repair and Overhaul
SHELL	Software, Hardware, Environment, Liveware
SMM	Safety Management Manual
SMS	Safety Management System
SOPs	Standard Operating Procedures

Main Concepts[1]

Accident (ICAO, 2013): an occurrence associated with the operation of an aircraft, which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

- a person is fatally or seriously injured as a result of:
    - Being in the aircraft, or
    - Direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
    - Direct exposure to jet blast; or
- the aircraft sustains damage or structural failure which:
    - adversely affects the structural strength, performance or flight characteristics of the aircraft, and
    - would normally require major repair or replacement of the affected component, or
- the aircraft is missing or is completely inaccessible.

Hazard (ICAO, 2018)**:** a condition or an object with the potential to cause or contribute to an aircraft accident or incident.

Incident (ICAO, 2013): an occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.

Risk mitigation (ICAO, 2018): the process of incorporating defences, preventive controls or recovery measures to lower the severity and/or likelihood of a hazard's projected consequence.

Safety (ICAO, 2018): the state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

Safety Risk (ICAO, 2018)**:** the predicted probability and severity of the consequences or outcomes of a hazard.

[1] The definitions used are the original ones in ICAO documentation.

Chapter 1 - Introduction

1.1 Motivation

In its early days, commercial aviation was poorly regulated, characterized by underdeveloped technology and infrastructures and it was one of the activities with the highest frequency of accidents.

From the early 1900s until the late 1960s, most of the safety deficiencies were related to technological failures. Accident investigation was the principal mean of prevention, which led to technological improvements that gradually declined accident frequency and increased regulatory drive. By the 1950s, aviation was becoming (in terms of accidents) one of the safest industries, but also one of the most heavily regulated (Natalia Distefano, 2013).

Between 1970 and 1990 the focus on safety was extended in order to include human factors. Research indicates that 85% of all aviation accidents and serious incidents involve human error, and over 60% of these accidents have human factors as their primary cause (Flight Safety Foundation, 2019). At this time, human factors focused almost exclusively on people and their behaviour without placing it in a context.

Moreover, it is further recognized that the aviation system involves a complex interaction between technical and human-centred sub-systems operated by a wide range of different stakeholders (Airlines, Airports, ANSP and MRO etc.) (Ilias Maragakis, et al., 2009). This allowed directing the mitigation efforts not only to the individual but also to the situations and organization.

As an Air Operator with a large scope of scheduled and non-scheduled operations worldwide, EAA is exposed to many different hazards. The main problem is that as the operation changes, so do the hazards related to it. Although the company already had a Hazard Identification Log done in 2017, it needed to be reviewed, completed and improved.

1.2 Objective

The objective of this dissertation is to study the viability to create a Hazard Identification Log easy to use on a daily basis capable to assist the operational decisions process at euroAtlantic Airways.

1.3 Scope of the dissertation

Pursuant to the objective, the present research deals with hazard and risks processes associated with the operational activity of EAA, a Portuguese airline company that performs scheduled and non-scheduled operation across the world.

In particular, it focusses in the improvement of an existent Hazard Identification Log, through the analysis of the reports made during the last four years of operations, in order to enhance the planning of operations and as a consequence flight safety.

1.4 Methodology

For the purpose of this study, documental and bibliographic research about safety management system, hazard identification processes and risk analyses technics are used. The sources are all referred in the bibliography, which includes manuals and internal rules from EAA and external documents from different international authorities and agencies, like CASA, EASA, FAA and ICAO.

Then hazard data collection is mostly made through IQSMS[2] report system and also a previous existent EAA hazard log. To assure the same criteria is used in the risk assessments done in this dissertation and in the company daily operational, the EAA risk matrix is used. The manuals, the organization rules and the procedures of the company are used to find the mitigation measures that are presented.

EAA Safety Manager validated the results obtained. The final Hazard Identification Log was also audited in the last IOSA[3] in early May 2019.

1.5 Work Limits

The biggest limitation of this work is related to the quantity of the information available. The data used to create this study are limited to the hazard and occurrence reports done by the EAA in IQSMS between 2015 and 2019. Before 2015, EAA only had a paper report system without any database associated with it.

[2] See subchapter 3.2.1 IQSMS System.

[3] The IATA Operational Safety Audit (IOSA) Program is an internationally recognized and accepted evaluation system designed to assess the operational management and control systems of an airline. The IOSA audit creates a standard that is comparable on a world-wide basis, enabling and maximizing the joint use of audit reports. All IATA members are IOSA registered and must remain registered to maintain IATA membership.

1.6 Organization

This dissertation is divided into five chapters organized as follow:

The first chapter presents the motivation, objective, scope, methodology and works limits.

The second has a brief presentation of euroAtlantic Airways in terms of history, fleet information and operational overview from the last year.

The third chapter focus on EAA Safety Department, its structure and organization and the company Safety Management System. The IQSMS system and the Hazard Identification Log made in 2017 are also presented with focus on the aspects that require an assessment to be improved.

The fourth summarizes the state-of-art of the topic studied throughout this dissertation. This includes an introduction to accident origin, a brief description of SMS evolution and an introduction to safety risk management.

The fifth represents the case study procedure, including the methodology used to collect and treat the data and the validation process of risk assessment. The mitigation measures are established, and the hazards identification process is described and validated.

In the last chapter the conclusion of the work is presented, as well as the recommendations driven from the results achieved and the indication of future work that will enable to deepen relevant aspects.

Chapter 2 - euroAtlantic Airways

2.1 History

EAA is a Portuguese International Airline specialized in Charter Services[4], ACMI[5], long term Dry-Lease[6] and Ad Hoc[7] flights worldwide. Founded in August 1993 as Air Zarco, the company first adopted the trade name Air Madeira and later, in May 2000, the current name euroAtlantic Airways – Transportes Aéreos S.A. was adopted (EAA, 2019). In Figure 1 it is possible to see one of the Air Zarco aircraft. Despite being headquartered in Sintra, EAA operational base is Portela Airport, in Figo Maduro.

euroAtlantic Airways is an IATA member since November 2010 with the call sign YU, FAA (FAR129[8]), EASA (Air OPS1[9]) and IOSA certified since August 2009 (EAA, 2019).

Figure 1: Air Zarco Lockheed L-1011-385-3 TriStar 500 (Dallot, 2019)

[4] A non-scheduled operation using a contractual arrangement between an air carrier and an entity hiring or leasing its aircraft (ICAO, 2009).
[5] Wet lease contract that includes aircraft, crew, maintenance and insurance (INAC, 2003).
[6] Lease of an aircraft without any crew, whose operation is carried out under the tenant's AOC (INAC, 2003).
[7] Lease of an aircraft that do not exceed 5 consecutive days (INAC, 2003).
[8] FAR Part 129 prescribes rules governing the operation within the United States of foreign air carriers appropriately authorized by the Civil Aeronautics Board or the Department of Transportation (DOT) (FAA, 2019).
[9] Commission Regulation (EU) No 965/2012 (the so-called 'Air Ops Regulation') contains provisions for the four types of air operations with airplanes and helicopters, being type 1: commercial air transport (CAT) operations (EASA, 2019).

2.2 Fleet

EAA fleet is composed by one Boeing 777-200ER, six Boeing 767-300ER and one Boeing 737-800NG. Table 1 has all the aircrafts registration information and in Figure 2, Figure 3 and Figure 4 is possible to see an exemplar of each type of aircraft.

Table 1: euroAtlantic Airways Aircraft's Registration

Aircraft Type	Registration
Boeing 777-200 ER	CS-TFM
Boeing 767-300 ER	CS-TKR CS-TKS CS-TKT CS-TST CS-TSU CS-TSV
Boeing 737-800 NG	CS-TQU

Figure 2: euroAtlantic Airways Boeing 777-212 (ER) (EAA, 2019)

Figure 3: euroAtlantic Airways Boeing 767-300 ER (EAA, 2019)

Figure 4: euroAtlantic Airways Boeing 737-800 NG (EAA, 2019)

2.3 Operation overview

Nowadays the company operates regular and non-regular flights in the most diverse routes in North Atlantic with an Air Transport License and was a FAOC (Foreign Air Operator Certificate) to operate in the USA and Canada, Caribbean, Central and South Americas, Africa, Middle East, Pacific, Australia and Oceania (EAA, 2019). The company is also authorized to perform line maintenance in all its aircraft.

During 2018, 536.404 passengers were transported between more than 120 airports in a total of 25 ACMI operations, 4 charter operations and 1 regular operation.

Annex A contains information about EAA operations and routes during 2018. For confidentiality reasons, the client's names were replaced by numbers. Annex B is a map that shows the airports where EAA has been operating, indicating also the type of operation normally take there.

Chapter 3 – EAA Safety Department

EAA has its own Safety Department which is responsible to assure the safety of all company operations. EAA Safety objectives are based upon ICAO and IATA recommendations, European and National regulatory requirements, National State Safety Program, industry trends, internal organization data or combination of these considerations (EAA, 2019).

3.1 Structure and organization

Figure 5 represents the company general organization chart where it is possible to see the Safety Department is a consultant organ of the Accountable Manager.

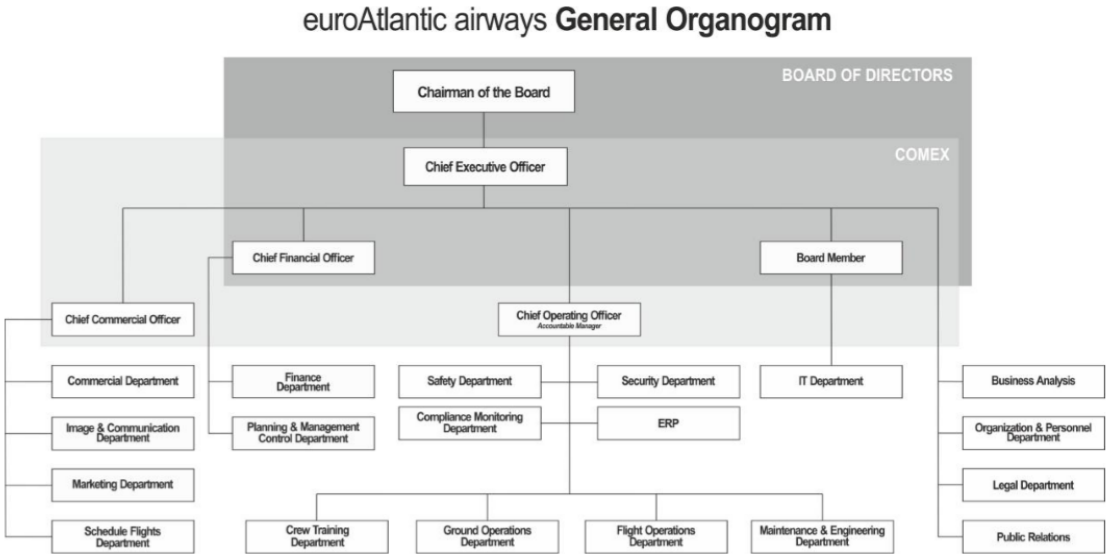

Figure 5: euroAtlantic Airways General Organization Chart (EAA, 2019)

The Accountable Manager has corporate authority for ensuring that all operations and maintenance activities can be financed and carried out to the standard required by the Authority, and to any additional requirements defined by euroAtlantic Airways. In Particular (EAA, 2019):

- The authority to ensure the allocation of resources necessary to manage safety risks;
- Overall responsibility and is accountable for ensuring operations are conducted in accordance with conditions and restrictions of the Air Operator Certificate (AOC), and in compliance with National and International authorities or other applicable regulations and standards of euroAtlantic Airways;

- Overall responsibility and accountability on behalf of euroAtlantic Airways for the implementation and maintenance of the Safety Management System throughout the organization.

Also has the responsibility to (EAA, 2019):

- define and approve the SMS policies and objectives;
- communicate to the organization the importance of an SMS;
- provide the resources (personnel, funding, and support) necessary to fulfil SMS requirements;
- foster a strong safety culture within the organization;
- facilitate the implementation of the SMS across the organization;
- promote awareness of safety requirements throughout the organization.

In Figure 6 the Safety Department organization chart is presented and is possible to see that the Safety Manager answers directly to the Accountable Manager.

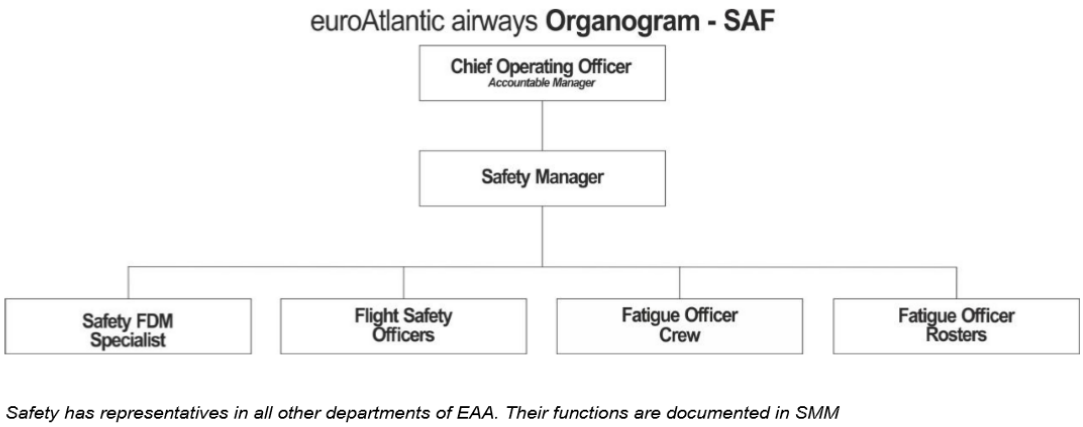

Figure 6: euroAtlantic Airways Safety Department Chart (EAA, 2019)

The Safety Manager is the individual responsible for the oversight of euroAtlantic airways' safety performance. He is the focal point for the development, implementation and day-to-day administration and maintenance of the SMS on behalf of the Accountable Manager, to whom he reports directly about all safety matters. In this way, safety reports and recommendations can be assured of the proper level of study, assessment and implementation. The Safety Manager coordinates SMS functions through the organization and is responsible, among other things, for facilitating the hazard identification, risk analysis and management processes (EAA, 2019).

3.2 euroAtlantic SMS

EAA has its own Safety Management Manual (SMM) where the company Safety Management System (SMS) is described. Its principal remarks are the company:

- Safety Policy,
- Safety Risk Management,
- Safety Assurance and
- Safety Promotion.

The Safety Policy states the company safety commitments regard proactive and systematic management. It is approved by the Accountable Manager and reviewed every 2 years. This policy complies with the applicable legislation, standards and best practices. It enforces Safety as a primary responsibility of all employees, especially the managers who continually promote the safety policy to all personnel. The policy also establishes a non-punitive reporting system of errors, occurrences and hazards within a positive safety culture environment (EAA, 2019).

In order to promote this safety culture, all staff must be aware of their responsibilities and consider the impact of their actions on safety. EAA SMS policies have been designed to promote a positive safety culture in four different areas (EAA, 2019):

- **Informed Culture**: it is assured that all personnel have necessary knowledge, skills and job experience to work safely and identify any hazard or threats to their safety.
- **Learning culture:** all staff is encouraged to apply their knowledge and develop their skills to improve organizational safety.
- **Reporting Culture**: as stated before, there is a reporting system named IQSMS where all employees can freely share critical safety information without fear of sanction.
- **Flexible Culture**: The EAA and its employees are capable of adapting effectively to changing demands.
- **Just Culture**: a non-punitive environment is necessary to assure the reporting culture, but EAA does not tolerate any illegal act, gross negligence, or a deliberate or wilful disregard of regulations or procedures. The organization recognizes and defines a line between acceptable and unacceptable actions or activities, known by all employees.

The company SMS ensures Safety Promotion through a complete SMS Training Program and Safety Communication. A systematic analysis is made to identify employees training needs and a training scheme is established and assessed effectively. The Safety Department provides three types of SMS training companywide: Initial, Advanced and Instructor courses (EAA, 2019). To ensure the dissemination of the current operational safety issues and safety related matters, communication is kept simple to easily involve all personnel and reinforce their commitment to safety. Safety information is spread through various communication channels to all the

organization areas and, when applicable, to external entities. Must use channels are e-mail, Chief Pilot Newsletters, Quarterly Safety Reports and Safety Bulletins (EAA, 2019).

The Safety Assurance consists in processes and activities undertaken to determine if SMS is operating according to the expectations and requirements previously defined. EAA Safety Department continually monitors internal processes to detect in advance any change or deviations that may introduce safety risks. This control is made through Safety Performance Indicators, Management of Change and Risk Assessments designed to each operation and operational area (EAA, 2019).

EAA Safety Risk Management System encompasses the assessment and mitigation of safety risks (EAA, 2019). Its objective is to assess the safety risks associated with identified hazards and, if necessary, then develop and implement effective and appropriate mitigations in order to reduce the risk to a level that can be tolerated by EAA having regard to its legal obligations and its policy.

3.2.1 IQSMS System

IQSMS is a digital platform, created by ASQS, that allows the user to manage operations safety, quality and risk in compliance with ICAO Doc. 9859, ICAO Annex 19, EASA and Enhanced IOSA requirements (EAA, 2019). EAA uses the following modules:

- Reporting
- Quality
- Risk Management
- Flight Risk
- Investigation

In the Reporting Module is possible to enter a new report, see the reports in process and the ones already published and to do statistical analysis. In Figure 7 is possible to see the kind of reports EAA personnel can do in the system. The overall purpose of this system is to make the best use of reported information to improve the level of safety performance and not to attribute blame. The scope of this system includes three types of report – mandatory, voluntary and confidential reports (EAA, 2019).

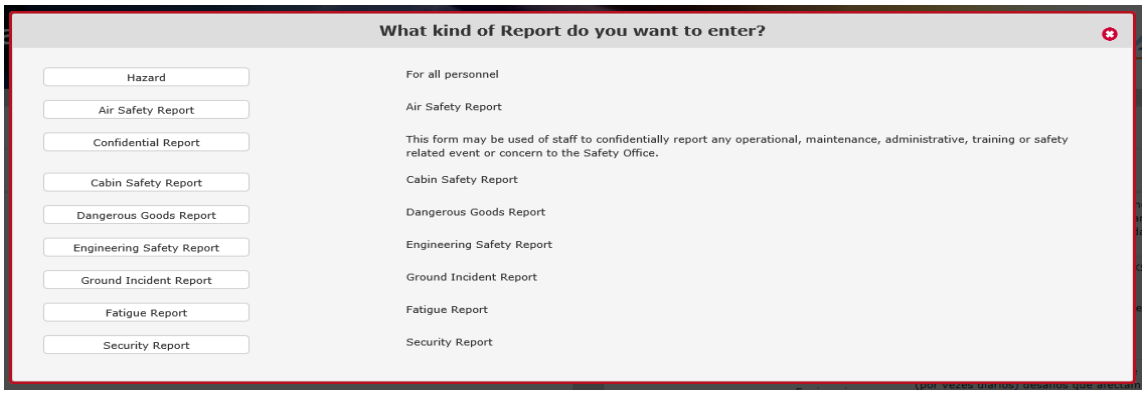

Figure 7: Kind of Reports Available in EAA IQSMS (ASQS, 2019)

Through this system is possible to send directly to ANAC and GPIAAF all the occurrences categorized as accidents, serious incidents and mandatory reports (EU Regulation 996/2010). An initial risk assessment is made for each occurrence when the report is approved for investigation and another one when it is closed, to assess the residual risk.

3.2.2 Hazard Identification Log

A Hazard Identification Log is defined by several authorities as a register that includes each identified hazard, the associated risks, the initial risk assessment, the mitigation measures that can be applied and the re-assessment of the risk once the mitigation actions have been implemented (CAA, 2013).

At the time this dissertation took place, EAA Safety Department has already been working on a Hazard Identification Log since 2017. This first list was the result of extensive research through national and international authority and agencies information and shared knowledge between EAA and other operators. It listed the general hazards that affect the civil aviation industry and can be seen in Annex C.

EAA decided to structure its first Hazard Identification Log in a very simple way. The first two pages corresponded to the Risk Matrix. It had a Safety Risk Assessment Matrix, a Safety Risk Tolerability Matrix, a Safety Risk Probability Table and a Safety Risk Severity Table. The objective was once the list was available for all employees everyone could understand the criteria used to elaborate the Risk Assessment. In the following twelve pages of the list, EAA decided to divide the hazards into five categories:

- Staff & Regulations,
- Human Factors,
- Work-Mission Environment,
- Maintenance-Preparation,
- and Aerial Mission.

EAA considered it was necessary to study the viability to improve this document in two different aspects: content and structure.

In terms of content, the company wanted to study the advantage to cross-check the safety information available in the IQSMS with the one existent in the Hazard Identification Log. The main objective was to check if the hazards affecting the company operation were, or not, the same affecting the civil aviation industry in general. It was also necessary to see if crossing this information, the risk assessment process would become more accurate and if it would be easier to control the effectiveness of the mitigation measures.

In terms of structure, the company required to organize the list contents and make it more user-friendly. The company needed a way to quickly identify each hazard and easily index it in case it was needed to associate a specific hazard to a safety report or occurrence.

Chapter 4 - Literature review

4.1 The origin of aircraft accidents

Within the context of aviation, elimination of accident and incidents is the ultimate goal, but it is also recognized that it cannot be guaranteed to be absolutely free from operational errors and their consequences. Progress in aviation safety can be described in four approaches, listed in Figure 8.

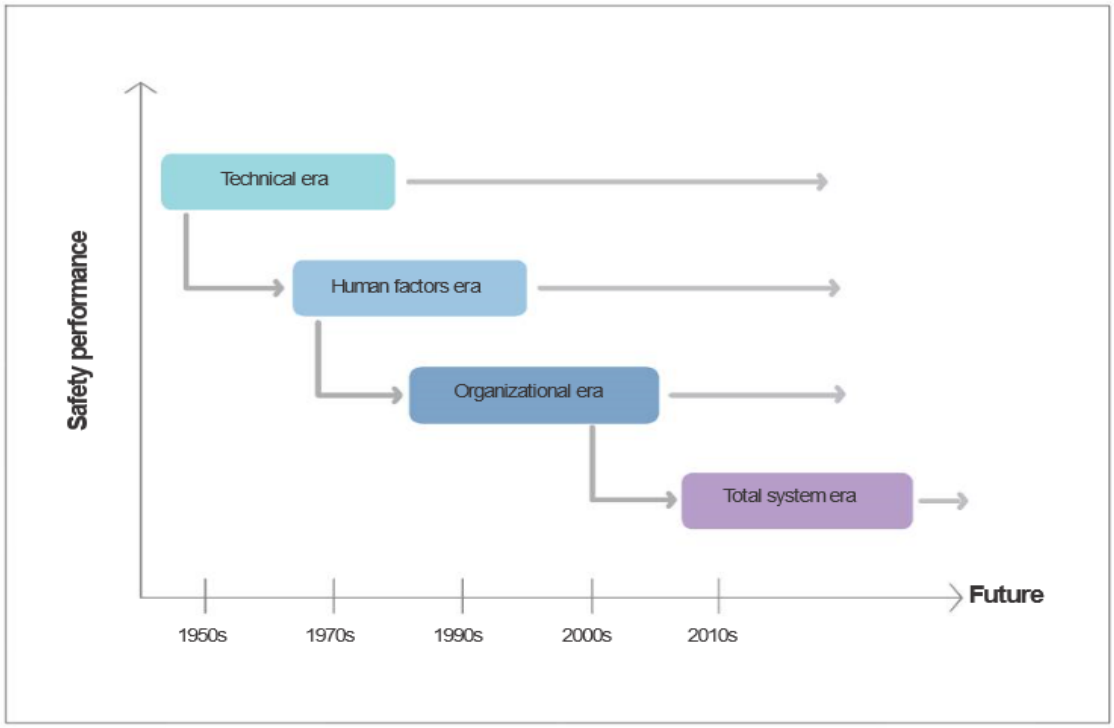

Figure 8: The Evolution of Safety (ICAO, 2018)

Between the 1900s and 1960s, aviation emerged as a form of mass transportation where most of the safety deficiencies were related to technical factors and technological failures. For this reason, the major efforts were placed in accident and incident investigations and improvement of technical factors. By the early 1970s, the frequency of aviation accidents had significantly declined due to major technological advances and enhancements of safety regulations (ICAO, 2018).

At this time, safety efforts extended to include human factors, focusing only on the individual and not considering the operation and organizational context. It was not until the early 1990s that it was acknowledged that individuals operate in a complex environment that includes multiple factors which could affect behaviour (ICAO, 2018).

During the mid-1990s, safety started to be seen from a systematic perspective. The notion of "organizational accident" was introduced (ICAO, 2018). This new approach considered the impact of organizational policies and culture on safety risk control. It also reflected the importance of data collection and analysis to detect emerging safety trends using reactive and proactive methods.

Since the beginning of the 21st-century safety entered in a so-called Total System approach. During the last years, it became clear that company safety systems focus more on individual safety performance and control than in the wider context of the aviation system worldwide. There are many examples of accidents and incidents showing that the interfaces between organizations have contributed to negative outcomes (ICAO, 2018). This led to the recognition of the complexity of the total aviation system.

4.1.1 Swiss Cheese Model

The Contribution of Latent Human Failures to the Breakdown of Complex Systems, by Professor James Reason, shows how an accident is the consequence of successive minor errors. Considering that a complex system can be represented by a Swiss Cheese, then the little holes in the cheese would be the breaches in this system defences (Reason, 1990).

The breaches can be caused by a number of enabling factors, like equipment malfunctions or operational errors. Complex systems, like aviation, are extremely well defended by defensive layers, so single-point failures are rarely consequential. The problem in these breaches may remain dormant until their effects are activated by operational circumstances. The Reason Model proposes that all accidents include a combination of both active failures and latent conditions (ICAO, 2018). This is presented in Figure 9.

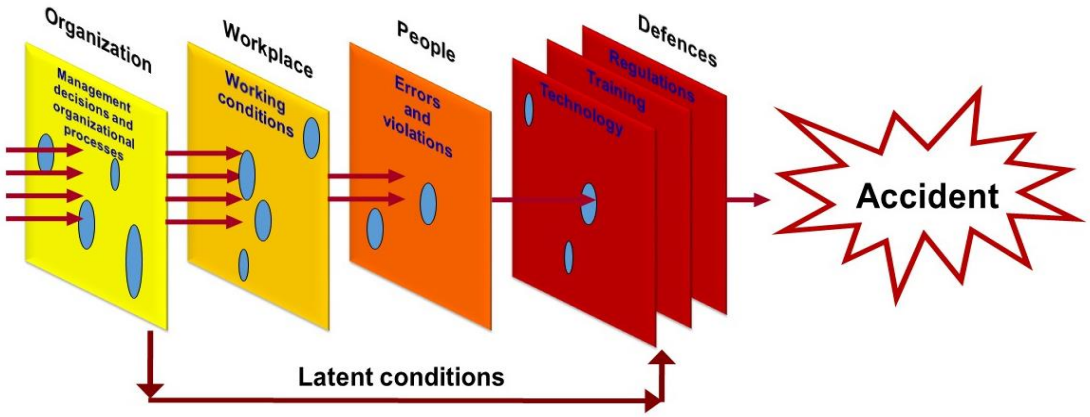

Figure 9: Swiss Cheese Model (EAA, 2018)

Active conditions are the actions or inactions which have an immediate adverse effect, like errors and violations. These are most associated with the front-line personnel (pilots, air traffic controllers, aircraft mechanics or technicians, etc.).

Latent conditions can exist in the system well before a damaging outcome (ICAO, 2018). The consequences of these conditions are the ones who may remain dormant for a long time.

These conditions are always present in the system prior to the accident and are generally created by people far removed in the time and space from the event (ICAO, 2018). They are dangerous because they have the potential to breach the last system safety net that usually consists in mitigation strategies and can be grouped into three large headings: technology, training and regulations.

Training deficiencies and incomplete or incorrect standard operating procedures are examples of latent conditions and may be created for several different reasons, like lack of safety culture, poor equipment/procedural design or defective management system (ICAO, 2013). It is possible to divide latent conditions into two clusters (ICAO, 2013):

- inadequate hazard identification and risk assessment: if the hazards are not correctly identified then they cannot be kept in control and will run freely in the system;
- normalization of deviance: when the exception becomes the rule.

Safety efforts should monitor organizational processes to identify all the hazards and latent conditions in order to strength the existing defences and develop new ones, when necessary.

4.1.2 SHELL Model

As mentioned before, aviation is a complex system and, in order to improve safety, it is necessary to understand how human performance may be influenced by external elements. Conceptual tools, like the SHELL Model, play an important role in this part of the study. This model, represented in Figure 10, has four components:

- Environment (E), the working environment where the system may function,
- Hardware (H), the machines and equipment,
- Liveware (L), the humans present (can be pilots, cabin crew, mechanics, etc.)
- Software (S), all the procedures, training, support, etc.

Figure 10: SHELL Model (ICAO, 2018)

In the centre is the Liveware, the humans that stand in the operations front line. Humans have the incredible capacity to adapt to a considerable number of conditions however, they are not standardized and do not interact perfectly with all the components which they work with. For these reasons the block edges are irregular, and the other components must be carefully matched to this centrepiece (ICAO, 2018):

- L-H interface represents the relationship between humans and all the physical parts (machines, equipment and facilities). There is a natural human tendency to adapt to L-H mismatches. This tendency has the potential to hide serious deficiencies what only may be discovered after an occurrence.
- L-S interface is the relationship between humans and the supporting system, like manuals, SOPs, computer software, regulations and checklists. It includes issues related to format and presentation, vocabulary, clarity, symbology, precision and user experience.
- L-L interface represents all the human relationships that exist in a workplace (between pilots, cabin crew, air traffic controllers, maintenance engineers and all the operational personnel). It is already recognized the importance of communication and interpersonal skills in human performance. Group dynamics, like CRM, have been adapted to ATS and maintenance operations to extend the management of operational errors across all aviation domain.
- L-E interface involves the relationship between humans and the surrounded environment. It is possible to divide the environment into two distinct areas: internal and external. The internal environment is the workplace physical characteristics: light,

noise, vibration, temperature and air quality. External environment includes the operational aspects such as weather factors, infrastructures and terrain. There is also a connection between human internal and external environment that can have a negative effect. Aviation work may include disturbances in the human biological rhythms and sleep patterns, which induces physiological effects like illness and fatigue. External psychological secondary sources, like financial uncertain and relationships or career concerns, when related to organization attributes, may affect decision-making processes and create pressures that leave to deviation from SOPs.

According to the SHELL model, a mismatch between the centred Liveware and any other component contributes to human error that can lead to an occurrence.

4.1.3 The 5M Model

This is another model used to describe the system under study. Like the SHELL one, it recognizes the interrelationships between humans, procedures, environment, hardware and software, as it is possible to see in Figure 11. The first step is to describe the system under consideration. This description has to include the general functions, physical characteristics and operations of the system. It also should refer the system boundaries, which means, limit the system to those elements that affect or interact with each other to accomplish the central mission (FAA, 2000).

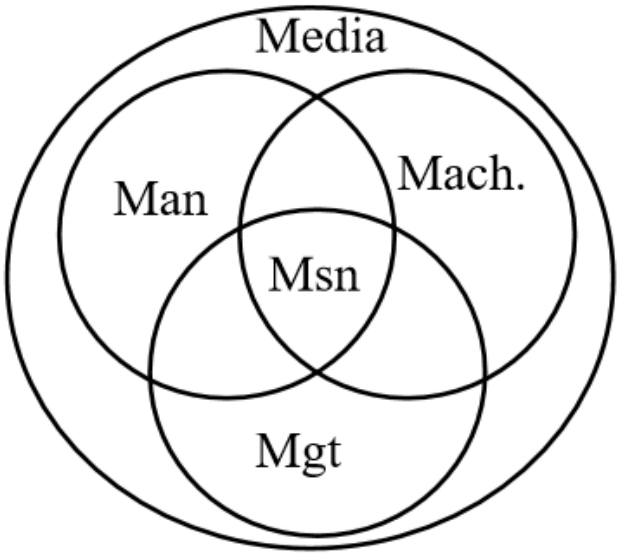

Figure 11: 5M Model (FAA, 2000)

This model has five elements (FAA, 2000):

- Msn – Mission: is the purpose or the central function of the system under analyse, it is the reason why all the other elements are brought together.
- Man: is the human element.

- Mach – Machine: is the hardware, software and firmware present in the system.
- Mgt – Management: includes the procedures, policy, and regulations involved in operating, maintaining, installing, and decommissioning a system.
- Media: is the environment where the system is installed, maintained and operated. It includes the operational environment (the conditions in which the mission is planned and executed) and the ambient conditions (temperature, humidity, lightning, radiation, vibration, etc.)

All these elements help to identify hazards, sources and causes throughout the analysis of the interrelationship between them. Later this analysis can be used to find the adequate risk mitigation strategies.

4.2 Safety Management System

As we already saw, major changes have occurred in commercial aviation safety system during the past century. The understanding of how accidents and incidents happen have evolved and more emphasis is being placed on the organizational factors that contribute to these occurrences.

A SMS is a systematic approach that helps to understand the hazards, the risk associated to them and the impact of that risk in the company (ICAO, 2013). It sets out the organization's structure, identifies the staff responsibilities and documents the necessary procedures to manage safety effectively. To do so, Safety has to be part of the organization culture.

Culture is characterized by the beliefs, values, biases and their resultant behaviour that are shared by members of a society, group or organization (ICAO, 2013). In the aviation world is easy to find a mix of cultural components that may vary greatly among organizations and can have a negative impact on safety. A strong and healthy Safety Culture relies on the trust and respect between all personnel.

An effective way to promote it is by sharing the commitment of individual responsibilities between employees and management. Staff will only consider the impact of safety in everything they do if management creates an environment where everyone feels responsible for safety. Management must also create a system where hazards, errors and threats can be reported without repercussions to the reporting person.

The reporting culture will emerge once all personnel believes in the benefits and ultimate effect of such a system. The system must be confidential and operate in accordance with non-punitive policies (ICAO, 2018). It should also provide feedback about safety improvements achieved through the investigation of the received reports. The success of a reporting system

depends upon the continuous flow of information from front-line personnel (ICAO, 2013). and a healthy reporting culture aims to determine the best course of action differentiating between intentional and unintentional deviations.

4.2.1 Safety Space

All operational activities have a risk linked to it. As the operation grows, so do the safety risks related to it (ICAO, 2018). The basic defences of an Organization are technology, training and internal procedures, that are used to keep safety risks under control. However, it is not possible, or even profitable, to eliminate all the risks associated with operations.

If a company allocates all its resources in risk controls, it will jeopardize the viability of the organization. In a similar way, if the company does not have the necessary defences the operation will probably end in an accident. Therefore, the safety space boundaries should be defined by the management of the organization and reviewed continually to ensure that they accurately reflect the current situation (ICAO, 2018).

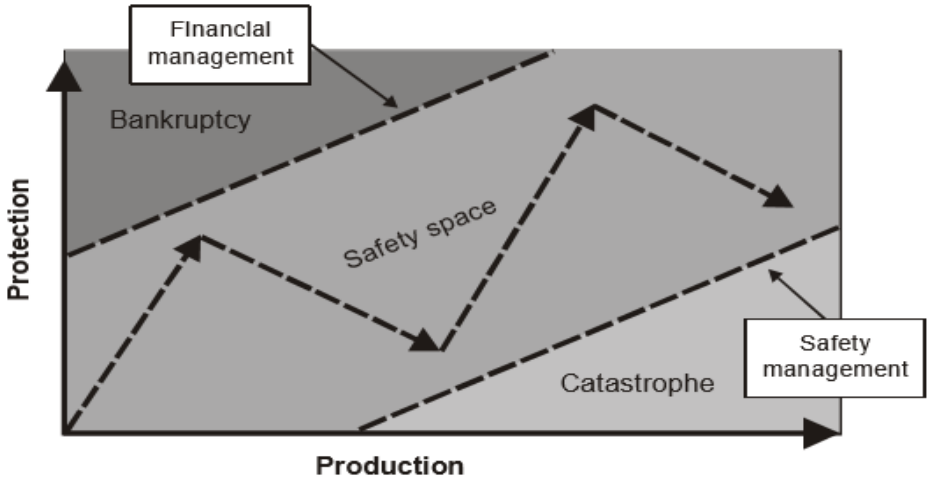

Figure 12: Safety Space (ICAO, 2013)

4.2.2 Components of SMS

The following 4 components are the cornerstones of a safety management system (ICAO, 2013):

- **Safety Policy and Objectives** – it states the organization's fundamental principles and philosophies of safety culture. Should be clear, have an unequivocal direction and be communicated to all staff throughout the organization.
- **Safety Risk Management** – divided into 3 main areas: hazard identification, risk assessment and mitigation processes. May also include an internal safety investigation. This component will be studied with more detail in the subchapter *4.4 Safety Risk Management*.

- **Safety Assurance** – organization's safety performance must be monitored, measured and reviewed so it can be continuously improved.
- **Safety Promotion** – it is important to assure all staff has appropriated training and education for their safety roles and responsibilities. Communication is essential to develop and maintain an adequate safety culture.

It is of extreme importance to recognize they are all interrelated, and they only can function effectively if built on a foundation of safety culture.

4.3 Safety Risk Management

The safety risk management is a key component of SMS. The process starts when a hazard is identified and a risk assessment in terms of likelihood and severity is done. Once the risk level is known we can implement mitigation measures, when necessary, to reduce the risk to a level as low as reasonably practicable (ALARP). Through work documents, like the Hazard Identification Log, is possible to monitor and keep in track all the progress that is done in the Safety Cycle (CAA, 2013).

In the next subchapters, the first three steps of this cycle are explained, as an introduction to the main topic of this dissertation. Figure 13 is a scheme of the Safety Cycle.

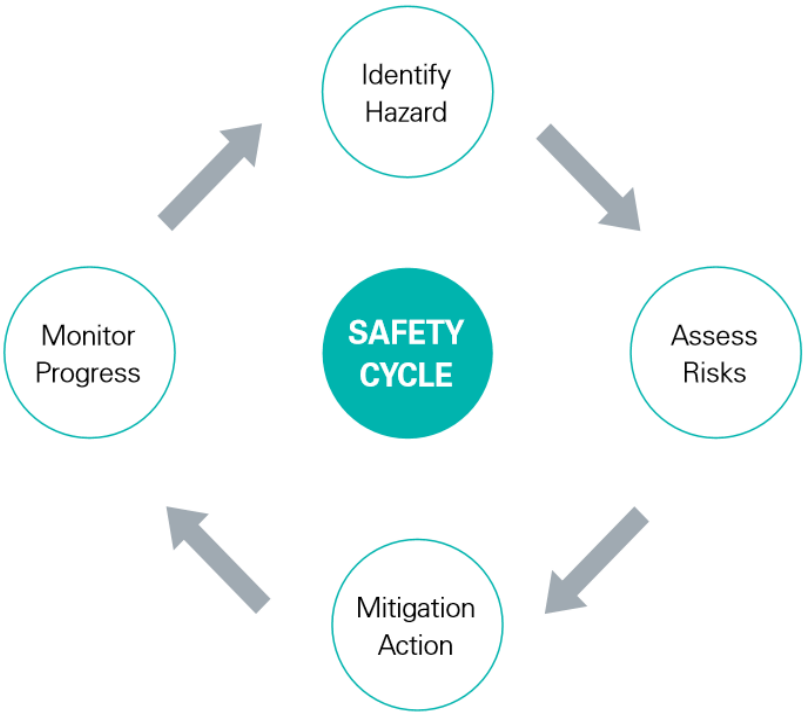

Figure 13: Simple safety risk management process (CAA, 2013)

4.3.1 Hazard Identification

If a hazard cannot be identified, it cannot be controlled (CASA, 2014). Hazard identification is the formal step to collect and record all the information about the hazards that affect the organization operational activities. It considers all the possible hazards that may exist within the scope of the service provider's aviation activities including interface with other systems, both within and external to the organization (ICAO, 2018).

It is an ongoing process that should be performed periodically and especially whenever there is an organizational change, the introduction of new equipment/procedures or change in the operation. Hazards identification shall be based on a combination of reactive and proactive methods of safety data collection (ICAO, 2018). Reactive methods are those which analyse the past outcomes or events. Examples of proactive methods include the collection and analysis of flight data, safety reporting systems and safety assurance function.

4.3.2 Risk Assessment

The main objective of this step is to allow the organization to assess the risk level associated with the hazards previously identified (CAA, 2013). In order to do so, it is necessary to identify the root causes of each hazard. After this first step, risk should be assessed in terms of likelihood and severity. Depending on the risk level, mitigation measures can be taken in order to eliminate the risk or to reduce it to a lower level.

This assessment is also used to rank the risk potential so priorities can be established. This allows the organization to manage its resources in a more effective way, applying more efforts to reduce the high-risk level.

All risk assessments are reliant on the quality of the information used to make the assessment, and the knowledge of the people conducting it (CAA, 2013).

4.3.2.1 Risk Severity

Safety risk severity is defined as the extent of harm that might reasonably be expected to occur as a consequence or outcome of the identified hazard. The severity assessment should consider all possible consequences related to a hazard, taking into account the worst foreseeable situation in terms of (ICAO, 2018):

- Fatalities or serious injury which would occur,
- Damage or structural failure sustained by the aircraft,
- Damage sustained by ATS or aerodrome equipment

Severity classification is normally divided into five levels from Negligible (the lower one) until Catastrophic (the higher one) like it is shown in Table 2. In Chapter 5 a table with the probability levels used during this dissertation is presented.

Table 2: Example of Safety Risk Severity Levels Table (ICAO, 2018)

Severity	Meaning	Value
Catastrophic	Aircraft/Equipment destroyed Multiple deaths	A
Hazardous	Major equipment damage Serious Injury	B
Major	Serious Incident Injury to person	C
Minor	Minor incident Nuisance Operating limitations	D
Negligible	Few consequences	E

4.3.2.2 Risk Probability

Safety risk probability is the likelihood that a safety consequence or outcome will occur. The following questions can assist in the determination of probability (ICAO, 2018):

- Is there a history of occurrences similar to the one under consideration, or is this an isolated occurrence?
- What other equipment or component of the same type might have similar issues?
- What is the number of personnel following, or subject to, the procedures in question?

Probability classification is usually divided into five levels that go from Extremely Improbable (the lower one) until Frequent (the higher one) like it is shown in Table 3. In Chapter 5 a table with the probability levels used during this dissertation is presented.

Table 3: Example of Safety Risk Probability Levels Table (ICAO, 2018)

Probability	Meaning	Value
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely Improbable	Almost inconceivable that the event will occur	1

4.3.2.3 Risk Tolerability

The safety risk index is created by combining the results of the probability and severity scores. The safety risk assessment matrix is used to determine safety risk tolerability (ICAO, 2018). Risks can be classified as “acceptable”, “tolerable” or “unacceptable”. To help in this step, matrixes like the ones in Table 4 and Table 5 can be used.

Table 4: Example of Safety Risk Matrix (ICAO, 2018)

Safety Risk		*Severity*				
Probability		*Catastrophic A*	*Hazardous B*	*Major C*	*Minor D*	*Negligible E*
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

Table 5: Example of Safety Risk Tolerability (ICAO, 2018)

Safety Risk Index Range	*Safety Risk Description*	*Recommended Action*
5A, 5B, 5C, 4A, 4B, 3A	INTOLERABLE	Take immediate action to mitigate the risk or stop the activity. Perform priority safety risk mitigation to ensure additional or enhanced preventative controls are in place to bring down the safety risk index to tolerable.
5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	TOLERABLE	Can be tolerated based on the safety risk mitigation. It may require management decision to accept the risk.
3E, 2D, 2E, 1B, 1C, 1D, 1E	ACCEPTABLE	Acceptable as is. No further safety risk mitigation required.

If the risk is unacceptable the operation or activity should not take place until major mitigation measures to eliminate or reduce the risk severity or likelihood to ALARP are taken.

If the risk falls in the tolerable region it means that either the severity or the likelihood of the occurrence is of concern. Mitigation measures to reduce the risk to a level ALARP should be taken.

When the risk is acceptable it means the consequences are so unlikely or not severe enough to be of concern with.

4.3.3 Risk Mitigation

Mitigation measures are often referred to as safety risk control. The level of safety risk can be lowered by reducing the severity of the potential consequences, reducing the likelihood of occurrences or by reducing the exposure to that safety risk. These measures can be divided into three categories (ICAO, 2018):

- **Avoidance**: the operation or activity is cancelled because the safety risks involved exceed the benefits of continuing forward.
- **Reduction**: the frequency of the operation or activity is reduced, or an action is taken to reduce the magnitude of the consequences.
- **Segregation**: an action is taken to isolate the effects of the risk, or to build redundancy to protect against them.

These measures should be balanced against the time cost and difficulty of taking action to reduce or eliminate the risk. It is important to consider the full range of possible control measures to find an optimal solution. The following aspects of each risk mitigation measure should be considered (ICAO, 2018):

- Effectiveness,
- Cost/Benefit,
- Practicality,
- Acceptability,
- Enforceability,
- Durability,
- Residual Safety risk,
- Unintended consequences, and
- Time.

Chapter 5 - Hazard Identification Log

5.1 Log Organization

As shown in *3.2.2 Hazard Identification Log*, EAA already had a Hazard Log that had been used for 2 years before this dissertation took place. In order to not impair the operation and make the transition from the old list to the new one as smoothly as possible, it was decided to keep it divided into 5 main areas. These areas, known as Hazard Groups, were named following the main principle behind the 5M Model philosophy, this means it tries to describe the system general functions, operations and physical characteristics by limiting the system to those elements that affect or interact with each other. Following this principle, the names chosen for these five Hazard Groups were:

- Organization (ORG),
- Human Factors (HF),
- Environment (ENV),
- Technical (TEC), and
- Operations (OP).

Afterwards, the groups were divided into subareas. Each subarea has a number and a title that is not repeated in the Hazard Group they belong. The aim of these subareas is to help organize the hazards, so it becomes easier and faster for the user to look for a specific one when needed. The titles were defined with the collaboration of the safety representatives of each operational area considering the common theme of the hazards identified. In the next subchapters, from 5.1.1 until 5.1.5, more information is given about each Hazard Group, its subareas and the kind of hazard catalogued.

To easily identify each hazard, the correspondent subarea and hazard group, a serial number in the format *XX(X)-YY-ZZ*, was developed: *X* stands for the two or three letters that identify the Hazard Group, *Y* corresponds to the number of the subarea in the Hazard Group previously identified and *Z* is the rank number of the hazard in that subarea. For example:

- ORG-02-05 is the fifth hazard in the Training subarea of Organization hazard group,
- HF-03-01 is the first hazard from Stress subarea in Human Factors hazard group.

It was also decided to keep the same number of columns and the same designation it had in the first Hazard Identification Log. So, each hazard has: a hazard number, the date when it was last revised, a brief description, the specific nature of the hazard, the initial risk analysis, the

mitigation measures, the residual risk analysis, the documentation and in place references, additional measures (if applicable) and the reports related to it (if applicable).

5.1.1 ORG - Organization Hazard Group

This group focus on the basic necessities of the various operational fields of the company in terms of organizational culture and work capacity. All the procedures, policy, and regulations involved were also taken into account. It is divided into seven subareas:

- 01 – Recruitment,
- 02 – Training,
- 03 – Team Composition,
- 04 – Documentation,
- 05 – External Providers,
- 06 – Employee's Needs, and
- 07 – Processes.

5.1.2 HF – Human Factors Hazard Group

People are the heart of any system. As so, human factors are one of the most studied matters in the last 50 years of safety investigations. Understanding what can affect our personnel and how it influences their work is critical to assure all the mitigation actions are taken on time to avoid an accident. Because humans are complex beings, and not all of us react in the same way, is important to evaluate each situation carefully. This group is divided into eight subareas:

- 01 – Medical/Health,
- 02 – Fatigue,
- 03 – Stress,
- 04 – Pressure,
- 05 – Indiscipline,
- 06 – Excessive Confidence,
- 07 – Human Error, and
- 08 – Communication.

5.1.3 ENV - Environmental Hazard Group

As explained in *4.1.2 SHELL Model*, there are different ways to characterize the interface between humans and the surrounded environment. The six subareas of this group aim to describe the principal environment conditions that influence the operator's activities:

- 01 – Meteorology,
- 02 – Atmosphere,
- 03 – Terrain,
- 04 – Airport,
- 05 – Work Time, and
- 06 – Work Space.

5.1.4 TEC - Technical Hazard Group

As saw in chapter *4.1 Accident Origin*, in the earlier days of aviation technical failures were point out as the main factor contributing to accident and incident. Over time aircrafts structure, system and components evolved and the equipment became more reliable. Despite this evolution, technical failures still happen and constituting hazards that should be monitoring and controlled. For this, eight subareas were created:

- 01 – Material,
- 02 – Fuel,
- 03 – Systems,
- 04 –Engine, APU,
- 05 – Structure,
- 06 – Landing Gear, Brakes and Wheels,
- 07 – Aerodynamic Surfaces, and
- 08 – Fluids.

EAA has three different types of aircraft and because some system/components are specified in each one of them, a subarea for each fleet was created:

- B767 Fleet,
- B737 Fleet, and
- B777 Fleet.

5.1.5 OP - Operations Hazard Group

The last Hazard Group involves all the operational areas of the company, besides maintenance, and it is divided into nine subareas:

- 01 – Documentation, Information and Forms,
- 02 – Aerodrome Operating Conditions,
- 03 – Cargo,
- 04 – Passengers and Baggage,
- 05 – ATC,

- 06 – Pre and After Flight,
- 07 – Take-off and Climb,
- 08 – Cruise, and
- 09 – Approach and Landing.

Like in the first group, this one also has a subarea related to documentation but, while in the first one it was related with the bureaucratic process, here it is concerned with the capacity and importance of such process in the operational field.

5.2 Data Collection

In addition to the information given by the list done by the EAA Safety Department in 2017, more data were needed to elaborate the new list. The objective was to complete the work previously done with more detailed information about the operational hazards that has been affecting EAA during its last years of activity.

As stated in chapter *3.2.1 IQSMS System*, euroAtlantic has a reporting system where all employees can report any hazard or occurrence they may find during their daily activity. The reporting system license agreement was signed in 1st May 2015 and the reports done in the paper system since the beginning of that year were uploaded to the system during the first month of use. Until April 2019, the month during which the data collection was made, a total number of 930 reports were made through this system.

The IQSMS has a software tool which allows the user to export an excel Report List based in more than 150 available fields. For this study, the fields selected were the following:

- Report ID,
- Create Time (UTC),
- Root Cause Group,
- Effect Group,
- Risk Level (Initial),
- Risk Level (Residual),
- Title, and
- Report Text.

The reason why those fields were selected and the type of information that it is possible to get from them is explained forward in subchapter *5.3 Data reduction*.

5.3 Data reduction

First, all the information contained in the Hazard Identification Log from 2017 was manually segregated to the correspondent group and subarea. To do so, it was necessary to analyse the Description and the Specific Nature of each one of the hazards individually. Later the same happened with the data collected from the IQSMS system but, due to the way these data were gathered, it needs to be worked before it was entered in the list. The following paragraphs describe how this was done and the specific information that is possible to get from each field.

The **Report ID** was used to identify the reports. Every time a report is entered in the IQSMS, the system automatically assigns a sequential number to it. This numbers cannot be repeated, even if a report is deleted or related to another one. This ID number is the one used to identify the reports related to each hazard in the "Report ID" column of the new list.

Because EAA was operating during the time the data collection was made, new reports entered the system every week. To make it easier for the analysis and creation of this new list, it was necessary to establish the dates between which the data from IQSMS system would be considered. The **Create Time (UTC)** field was used to help establish this limit. The period considered was between 1st January 2015 and 30th March 2019, which equals 802 reports.

Root Cause Group and **Effect Group** were used during the first data screening. These parameters were filled during the Initial Risk Assessment done at the time a report is approved to start the investigation. The first step was to associate each Root Cause Group and Effect Group to one of the Hazard Group like it is shown in Table 6 and Table 7.

Once this correspondence was done the reports screening started. At a first level, the reports were allocated in each Hazard Group considering the Root Cause Group they were associated with. But, as it is possible to see in Table 6, not all Root Cause Group have a correspondent Hazard Group and some have even more than one associated to it. For these cases, it was necessary to resort to the correspondence shown in Table 7.

The **Title** and **Report Text** fields were downloaded so each report could be individually analysed. Using this, two different things were accomplished: first, assure each report was allocated in the correct Hazard Group and correspondent subarea; second, identify the specific hazard that originated the occurrence.

Table 6: Root Cause Group and correspondent Hazard Group (ASQS, 2019)

Root Cause Group	Hazard Group
Aircraft Control / Performance	Operations
Aircraft Design	Technical
Aircraft Structure	Technical
Aircraft Systems	Technical
Airplane / Equipment Damage Error	Technical
Airside Operations	Operations
Appointment of Key Personnel	Organization
Appointment of Key Personnel Management responsibility and accountability	Organization
ATC / Ground Aids	Operations
Cargo Handling	Operations
Communication	ORG/OP
Documentation	Organization
Documentation & Records	Organization
Emergency Response Program	Organization
Engine	Technical
Environmental / Weather	Environment
External Entity Management	Organization
Fault Isolation / Test / Inspection Error	TEC/OP
Fire	Operations
Flight Crew	Human factors
Foreign Object Damage Error	OPS/TEC
Fuelling	Technical
Ground Handling	Operations
GSE Maintenance	Technical
Human Factor	Human factors
Infrastructure	Environment
Installation Error	Technical
Leadership & Management	Organization
Load Control	Operations
Maintenance General	Technical
Management	Organization
Managing Change	Organization
Organisation	Organization
Other	-
Passenger	Operations
Passenger & Baggage Handling	Operations
Performance Monitoring & Measuring	ORG/TEC
Personal Injury Error	Human factors
Process & Activity Management	Organization
Qualification Training Program & Promotion Selection	Organization
Risk Management	Organization
Safety & Quality Assurance	Organization
Servicing Error	Operations
Smoke	Operations
Training & Qualification	Organization

Table 7: Effect Group and correspondent Hazard Group (ASQS, 2019)

Effect Group	Hazard Group
Admin Staff	Human factors
Aircraft Technical Status	Technical
Airport	Operations
Continuing Airworthiness	Technical
Crew	Human factors
Flight	Operations
Ground Crew	Human Factors
Passenger	Operations

5.4 Risk Assessment Process

After all the hazards have been identified each one of them was risk assessed individually. As explained in *4.3.2 Risk Assessment* the quality of the assessment depends a lot from the available information about the hazard that is under analysis. Also, in the same subchapter, it is referred that two risk assessments must be made: one when the hazard is identified (Initial Risk Assessment) and a second one after mitigation measures have been applied (Residual Risk Assessment).

The first step was to check if the hazard had, or not, any report related to it. If it had, then it was necessary to access the report and study its text to understand what, when and how it happened. Then the risk assessment taken in the IQSMS system, at the time the investigation was opened, was reviewed to see if the probability and severity level chosen at that time still made sense in the present day. When a hazard had more than one IQSMS report related to it, the higher risk assessment level was considered.

If the hazard did not have any report related to it, then the 2017 Hazard Identification Log was consulted to collect the information relative to that hazard. This information was analysed to assure the hazard severity and likelihood continued to be the same in the EAA current operations. These analyses were made with the contribution of the Safety Representatives of each correspondent area.

The probability and severity level of each hazard were defined according to Table 8 and Table 9, respectively. Table 8 expresses the probability of a hazard to occur considering its frequency during the last 3 years of operations and the history of the aviation industry. Table 9 is more complex and it reflects the severity of the consequences in terms of personnel, environment and material. Through the values obtained from both tables is possible to get the Safety Risk Assessment from Table 10.

Table 8: Safety Risk Probability Table (EAA, 2019)

SAFETY RISK PROBABILITY TABLE		
RISK PROBABILITY	**MEANING**	**VALUE**
FREQUENT	**Likely to occur many times** (has already occurred in the company (Freq. > 3 x year). Has occurred frequently in the history of the aviation industry)	**5**
OCCASIONAL	**Likely to occur sometimes** (has already occurred in the company (Freq. < 3 x year). Has occurred infrequently in the history of the aviation industry)	**4**
REMOTE	**Unlikely to occur, but possible** (has already occurred in the company at least once. Has regularly occured in the history of the aviation industry)	**3**
IMPROBABLE	**Very unlikely to occur** (not known to have occurred in the company but has already occurred at least once in the history of the aviation industry)	**2**
EXTREMELY IMPROBABLE	**Almost inconceivable that the event will occur** (it has never occurred in the history of the aviation industry)	**1**

Table 9: Safety Risk Severity Table (EAA, 2019)

SAFETY RISK SEVERITY TABLE					
SEVERITY OF OCCURRENCE	**MEANING**				**VALUE**
	PERSONNEL	**ENVIRONMENT**	**MATERIAL**	**IMAGE**	
CATASTROPHIC	Multiple fatalities	Massive effects (pollution, destruction, etc.)	Damage> 1 M€	International impact	**E**
HAZARDOUS	Fatality	Effects difficult to repair	Damage< 1 M€	National impact	**D**
MAJOR	Serious injuries	Noteworthy local effects	Damage< 250K€	Considerable impact	**C**
MINOR	Slight injuries	Little impact	Damage< 50K€	Limited impact	**B**
NEGLIGIBLE	Superficial or no injuries	Negligible or no effects	Damage < 10K€	Light or no impact	**A**

Table 10: Safety Risk Assessment Matrix (EAA, 2019)

SAFETY RISK ASSESSMENT MATRIX					
RISK PROBABILITY	**RISK SEVERITY**				
	NEGLIGIBLE (A)	MINOR (B)	MAJOR (C)	HAZARDOUS (D)	CATASTROPHIC (E)
FREQUENT (5)	**5 A**	**5 B**	**5 C**	**5 D**	**5 E**
OCCASIONAL (4)	**4 A**	**4 B**	**4 C**	**4 D**	**4 E**
REMOTE (3)	**3 A**	**3 B**	**3 C**	**3 D**	**3 E**
IMPROBABLE (2)	**2 A**	**2 B**	**2 C**	**2 D**	**2 E**
EXTREMELY IMPROBABLE (1)	**1 A**	**1 B**	**1 C**	**1 D**	**1 E**

After mitigation measures were put in place, the Residual Risk Assessment was performed to all hazards using the same probability, severity and risk matrix used to approve the Initial Risk Assessment. The objective was to verify the effectiveness of each mitigation measure.

5.5 Mitigation measures and documentation

As an Air Operator, EAA has its own organizational manuals, procedures, policies and other documents that rule the company activities and behaviours. All those documents play an important role when talking about mitigation measures.

At this point in the work, the Hazard Identification Log from 2017 was the biggest contribution, because the majority of the hazards identified in that list already had mitigation measures in place. This made the process faster because there was already a general idea where to find the information needed for each Hazard Group and, in some cases, Subareas.

It was possible to divide the mitigation process into two different approaches: the hazards that already had mitigation measures in the Hazard Log from 2017 and the ones that were totally new.

The approach to the first group was simple. First, the mitigation measure was analysed to assure it continues to make sense and controlling the hazard considering the present type of operations. If it did, then the referred document was checked to see if the mitigation measure was correctly documented there. However, if the mitigation measure was not appropriated or sufficient to control the hazard, it had to be rethought and customised in order to do so.

For the second group, the approach was very similar to the one explained in the last sentence of the previous paragraph. The difference was that most of the new hazards were related to IQSMS reports that were already closed. This detail was really helpful because it was possible to consult the occurrence investigation in the system and see which mitigation measures were taken at the time to correct or prevent the situation.

All the mitigation measures presented were analysed and discussed with the Safety Representatives of each area involved. The ones documented were already implemented in the company at the time this dissertation was finished.

5.6 Results discussion and validation process

The complete Hazard Identification Log from 2017 and 2019 can be seen in Annex C and Annex D, respectively. The main differences between both lists are presented in Table 11.

Table 11: Main Differences between both Hazard Identification Logs

Hazard Identification Log 2017	Hazard Identification Log 2019
Divided only in 5 groups	Divided into 5 main groups, named accordingly to 5M Model. Each group is divided into subareas
Hazards identified with group letters and numbers	Hazard identified with a serial number, which states to each Hazard Group and subarea it belongs
General information about the main hazards in the industry	Information about the main hazards in the industry and specific hazards of the company operations
Does not have any information regarding the reporting system	Identifies the reports done in IQSMS related to each hazard
Risk Assessment was done based on operational experience	Risk Assessment based on operational experience and on the report's information

The results obtained were validated by EAA Safety Manager and through IOSA audit in May 2019. The validation process by IOSA was crucial, not only for the dissertation but mainly to EAA to ensure compliance with IOSA requirements. In this case, the ISARP in question is (IATA, 2018):

"ORG 3.1.1 The Operator shall have a hazard identification program that is implemented and integrated throughout the organization, to include:

i. A combination of reactive and proactive methods of hazard identification;
ii. Processes for safety data analysis that identify existing hazards, and may predict future hazards, to aircraft operations"

In order to approve one ISARPs without Non-Conformities, it is necessary to have everything well documented and implemented. The process described in this dissertation and the final list which resulted from it were used as implementation proofs and passed in this ISARP with zero Non-Conformities.

The Safety Department is responsible to keep the Hazard Identification Log updated with the information of the new reports made in the IQSMS. The Safety Representatives from each department are responsible to identify and analyse safety hazards within their department aiming at its' elimination or risk mitigation.

The Hazard Identification Log is a controlled document and it is available for all employees from the company in the intranet - JUPITER.

Chapter 6 - Conclusions and future work

6.1 Conclusion

Nowadays various aviation regulators and authorities, like ICAO and EASA, recognize the importance of operators know the risks associated with their daily operations. As an IATA member with IOSA certificate, EAA needs, among other things, to assure they control the maximum numbers of hazards involved in its operations.

EAA started to develop a Hazard Identification Log in 2017. This first version of the document was built with information collected mainly from civil aviation regulators and agencies and other operators Safety Departments.

It was structured in a very simple way: two pages with the risk matrix followed by 12 pages where 142 hazards, divided into five categories, were identified, risk assessed and mitigated.

This first document only listed the general hazards that are common to all airline operators without considering the specific hazards related to EAA operations.

Also, it was not easy to use in a daily context once the information gathered in each category did not have any organization criteria. All these factors made it necessary for the company to conduct this feasibility study.

In order to improve the Hazard Identification Log already existent, it was necessary to do bibliographic research which allowed a better understanding of the theme under study. Various documents of international authorities and agencies, like ICAO, CASA, CAA and FAA, were consulted.

The evolution of the perception of accident origin was studied, as so the three models more used to describe it. Safety Management System, its space inside the company activities and its components were also covered, with special emphasis in Safety Risk Management, Hazard Identification Process, Risk Assessment and Risk Mitigation.

It was also necessary to do some research about the internal organization of the company and the Safety Department itself. The Organization Manual and the Safety Management Manual of EAA were consulted and used has main guides for document structuring. It also sustained the validation process done internally once the Safety Manager has the responsibility to coordinate the process of hazard identification and risk analysis on behalf of the Accountable Manager.

Data collection was essentially made using IQSMS Reporting System and its reduction was done manually. In order to make the change from the old Hazard Identification Log to the new one easier for all EAA personnel, it was decided to keep the five main Hazard Groups. However, there are two key features of this new Hazard Identification Log that make it easier and practical to use on a daily basis:

1. The Subareas System made it easier to find a specific hazard. Considering each Hazard Group as a book, the respective subareas are like the chapters. It not only helps the author segregating the information, as it helps the reader when is looking for a specific topic.
2. The Hazard Serial Number made it simple to catalogue and identify the hazards. The current system allows, in each one of the 5 Hazard Groups, to have up to 99 subareas with 99 specific hazards each. This allows the company to keep a complete register from all its operational hazards, even if some of them are not being considered in the current operation.

Another important achievement with this new Hazard Identification Log is the possibility to connect hazards and reports. This helps the Safety Department to keep track of the probability risk of the hazards and also allows to monitor which mitigation measures are, or not, being effective.

The results obtained were validated during the IOSA audit in May 2019 according to IOSA requirements.

This work also allowed a more detailed analysis from the safety reports made in EAA during the last 4 years, where it is possible to conclude the majority of the reports made are related with the Operation Hazard Group, followed by the Technical one.

6.2 Future Work

In this dissertation, has only the data available in the EAA IQSMS System and the Hazard Identification Log previously existent were considered, to improve the data collection process, predictive methods to identify new hazards could be used such as Operational Brainstorms[10] and Staff Surveys[11]. These are examples of predictive methods can be used to collect more specific information about simple hazards that affect daily operations.

[10] Small discussion groups meet to generate ideas, in a non-judgmental way, about operational hazards (CASA, 2014).
[11] Surveys that allow the operational staff to give their opinion about the most common hazards they easily identify in their work environment.

IQSMS data should continue to be collected and analysed to keep the risk probability of the events updated and control the efficiency of mitigation measures in place.

The list itself, has a living document, can also be improved. Hazards which have more reports associated to it should be reanalysed to see if it can, or not, be divided in more specific hazards easier to control.

It is recommended to start using the Hazard Identification Log has an index where relevant information about recurrently reported hazards can be found. This would make the report investigation easier and faster, once it already has me main mitigation measures that can be put in place.

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Annexes

Annex A – 2018 EAA Operations

EAA Operations 2018 - TOTAL PAX 536404

Regular Operations	Route
EAA - LIS/OXB/LIS	LIS/OXB OXB/LIS

Charter Operations	Route
Client 1	LIS/BGF BGF/LIS
Client 2	LIS/KTW KTW/LIS
Client 3	LIS/CCC CCC/LIS
Client 4	LIS/BGF BGF/LIS

ACMI Operations	Route
Client 5	LIS/LGW LGW/JFK JFK/LGW LGW/LIS
Client 6	LIS/LGW LGW/JFK JFK/LGW LGW/LIS ORY/EWR EWR/ORY DXB/ORY ORY/BOS BOS/EWR LIS/CPH CPH/JFK JFK/CPH CPH/LIS LIS/OSL OSL/JFK JFK/OSL OSL/LIS
Client 7	LIS/TFS TFS/ARN ARN/LIS
Client 8	LIS/ORY ORY/NAP NAP/ORY ORY/LIS

ACMI Operations	Route
Client 9	MXP/BRU BRU/CUN CUN/BRU BRU/LIS
Client 10	LIS/ORY ORY/EDI EDI/ORY ORY/LIS ORY/BUD BUD/ORY
Client 11	LIS/MXP MXP/CUN CUN/MXP MXP/FCO FCO/LIS LIS/BLQ BLQ/RMF RMF/FCO FCO/LIS
Client 12	LIS/AYT AYT/KUO KUO/AYT AYT/EIN EIN/AYT AYT/ARN ARN/AYT AYT/LIS
Client 13	LIS/HAV HAV/MAD MAD/HAV MAD/SCU SCU/HAV HAV/EZE EZE/CCC CCC/HAV HAV/LIS
Client 14	MED/GAU GAU/MED MED/FRU FRU/MED MED/OSS OSS/MED JED/OSS OSS/JED JED/TML TML/MED

ACMI Operations	Route
Client 14 (Cont.)	MED/TML
	MED/ACC
	ACC/MED
	MED/DNBK
	DNBK/MED
	MED/LOS
	LOS/MED
	MED/OXB
	OXB/JED
	JED/FRU
	FRU/JED
	JED/SKO
	SKO/JED
	JED/ABV
	ABV/JED
	JED/JIB
	JIB/JED
	JED/DMM
	DMM/JED
	JED/TUN
	TUN/LIS
	LIS/JED
	JED/LOS
	LOS/MED
	MED/LOS
	MED/OXB
	OXB/JED
	JED/OXB
	JED/KRT
	KRT/JED
	JED/RUH
	RUH/JED
	JED/SKO
	SKO/JED
	JED/DNBK
	DNBK/KAN
	KAN/JED
	JED/DNBK
	DNBK/KAN
	KAN/JED
Client 15	LIS/BUD
	BUD/JFK
	JFK/BUD
	BUD/ORD
	ORD/BUD
	ORD/WAW
	WAW/EWR
	EWR/WAW
	WAW/JFK
	JFK/WAW
	WAW/BUD
	BUD/NAP

ACMI Operations	Route
Client 16	LOS/LGW
	LGW/LOS
	LOS/ABV
	ABV/DXB
	DXB/ABV
	ABV/LOS
	DXB/LOS
	LOS/DXB
	LOS/LIS
	LIS/LGW
	LGW/LIS
	JED/LOS
	ABV/YOL
	YOL/ABV
	LOS/KAD
	KAD/ABV
	LOS/KAN
	KAN/JED
	LOS/JED
	JED/KAN
	KAN/LOS
	LOS/LOS
	LOS/ABV
	ABV/LOS
	ABV/YOL
	YOL/ABV
	LIS/LOS
	LOS/ABV
	ABV/LOS
	ABV/YOL
	YOL/ABV
Client 17	LIS/JED
	JED/LHE
	LHE/JED
	JED/ALG
	ALG/MED
	MED/JED
	JED/DMM
	DMM/JED
	JED/KRT
	KRT/JED
	JED/LIS
	JED/RUH
	RUH/DXB
	DXB/RUH
	RUH/JED
	JED/DXB
	DXB/JED
	JED/BGW
	BGW/MED
	MED/BGW
	MED/JED

ACMI Operations	Route
Client 17 (Cont.)	JED/LHE LHE/JED JED/KRT KRT/JED JED/KWI KWI/JED BGW/JED JED/KAN KAN/MED JED/ABV ABV/MED JED/ALG ALG/JED LIS/ALG JED/RUH RUH/JED MED/LIS
Client 18	LIS/MBJ MBJ/LIS
Client 19	LIS/MAO MAO/MAD MAD/LIS
Client 20	CDG/EWR EWR/CDG LIS/CDG CDG/BOS BOS/CDG
Client 21	LIS/NUE NUE/RMF RMF/NUE NUE/LIS
Client 22	LIS/TMS TMS/LIS
Client 23	LIS/AMS AMS/PBM PBM/AMS AMS/LIS
Client 24	LIS/RAI RAI/BOS BOS/RAI RAI/LIS LIS/SID SID/LIS SID/REC REC/SID RAI/SID OPO/CDG CDG/SID SID/LIS
Client 25	LIS/SSA SSA/LIS

ACMI Operations	Route
Client 25 (Cont.)	LIS/REC REC/LIS LIS/CCS CCS/LIS CCS/CUR CUR/FAO FAO/LIS LIS/NAT NAT/LIS LIS/GIG GIG/LIS LIS/GRU GRU/LIS LIS/FOR FOR/LIS LIS/OSL OSL/CPH CPH/LIS LIS/FCO FCO/LIS LIS/RAI RAI/SID SID/LIS LIS/MUC MUC/LIS LIS/OTP OTP/LIS LIS/TER TER/LIS LIS/BUD BUD/LIS LIS/SID LIS/DSS DSS/LIS RAI/LIS LIS/BCN BCN/LIS LIS/ZRH ZRH/LIS LIS/MXP MXP/LIS LIS/PRG PRG/LIS LIS/LHR LHR/LIS LIS/REC REC/LIS LIS/ORY ORY/LIS LIS/MAN MAN/LIS

ACMI Operations	Route
Client 26	BRU/MIA
	MIA/BRU
	LIS/BRU
	BRU/AYT
	AYT/BRU
	BRU/TFS
	TFS/BRU
	BRU/PFO
	PFO/BRU
	BRU/ALC
	ALC/BRU
	BRU/LPA
	LPA/FNC
	FNC/BRU
	BRU/RHO
	RHO/BRU
	AYT/OST
	OST/AYT
	BRU/VLC
	VLC/BRU
	LPA/BRU
	BRU/DJE
	DJE/BRU
	BRU/AGA
	AGA/BRU
	BRU/KGS
	KGS/BRU
	BRU/CHQ
	CHQ/BRU
	BRU/MAH
	MAH/IBZ
	IBZ/BRU
	BRU/HER
	HER/BRU
	BRU/PMI
	PMI/BRU
	BRU/BOJ
	BOJ/VAR
	VAR/BRU
	BRU/NBE
	NBE/BRU
	BRU/ACE
	ACE/FUE
	FUE/BRU
	BRU/AGP
	AGP/VLC
	BRU/NAP
	NAP/PMO
	PMO/BRU
	BRU/EIN
	EIN/LPA
	BRU/MAH

ACMI Operations	Route
Client 26 (Cont.)	MAH/IBZ
	IBZ/BRU
	AGA/RAK
	RAK/BRU
	BRU/VAR
	BRU/BDS
	BDS/SUF
	SUF/BRU
	BRU/DBV
	DBV/BRU
	BRU/KGS
	KGS/BRU
	BRU/BDS
	BDS/SUF
	SUF/BRU
	LIS/BRU
	BRU/POP
	POP/BRU
	BRU/SDQ
	SDQ/POP
	BRU/LIS
Client 27	BRU/AMS
	AMS/OHD
	OHD/AMS
	AMS/PDL
	PDL/AMS
	AMS/AOK
	AOK/AMS
	AMS/NBE
	NBE/AMS
	AMS/FAO
	FAO/AMS
	AMS/LPA
	LPA/AMS
	AMS/TER
	TER/PDL
	AMS/IBZ
	IBZ/AMS
	AMS/FNC
	FNC/AMS
	AMS/CFU
	CFU/AMS
	AMS/PMI
	PMI/AMS
	AMS/KGS
	KGS/AMS
	AMS/MJT
	MJT/AMS
	AMS/ACE
	ACE/AMS
	AMS/ZTH
	ZTH/AMS

ACMI Operations	Route
Client 27 (Cont.)	AMS/PUY
	PUY/AMS
	AMS/TFS
	TFS/AMS
	AMS/BOJ
	BOJ/AMS
	AMS/AYT
	AYT/AMS
	AMS/PUY
	PUY/AMS
	AMS/FAO
	FAO/AMS
	AMS/BOJ
	BOJ/AMS
	AMS/MJT
	MJT/AMS
	AMS/IBZ
	IBZ/AMS
	AMS/AOK
	AOK/AMS
	AMS/RHO
	RHO/AMS
	AMS/AYT
	AYT/AMS
	AMS/ZTH
	ZTH/AMS
	AMS/PUY
	PUY/AMS
	AMS/AOK
	AOK/AMS
	AMS/FAO
	FAO/AMS
	AMS/PMI
	PMI/AMS
	AMS/EFL
	EFL/AMS
	AMS/NAP
	OPO/AMS
	AMS/CUR
	CUR/AUA
	AUA/CUR
	CUR/AMS
	AMS/LIS

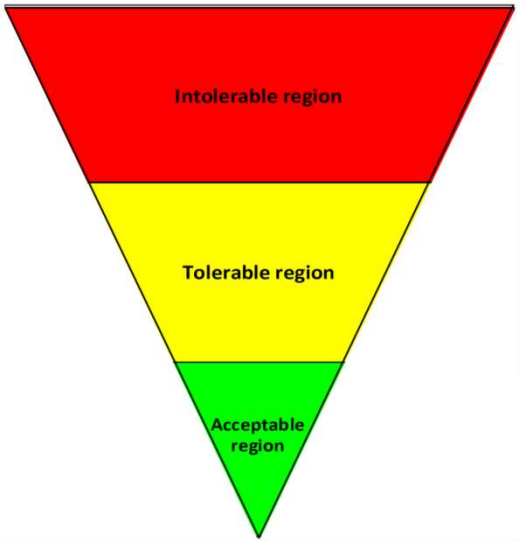
ACMI Operations	Route
Client 28	LIS/HEL
	HEL/SID
	SID/CPH
	CPH/ARN
	ARN/LPA
	LPA/ARN
	ARN/SID
	SID/ARN
	ARN/LIS
	LIS/BHX
	BHX/ACE
	ACE/BHX
	BHX/LIS
Client 29	KBP/JFK
	JFK/KBP
	KBP/LIS

Annex B – World Map with the Airports Operated by EAA

- **Non-Regular Airports** / ACMI | Wet & Dry Lease | Charter flights
- **Non-Regular Airport** / euroAtlantic flight code
- **Regular Airport** / Codeshare with STP Airways
- **Regular Airport** / euroAtlantic flight code
- Countries that are missed to land

Annex C – Hazard Identification Log 2017

SAFETY RISK ASSESSMENT MATRIX					
RISK PROBABILITY	RISK SEVERITY				
	NEGLIGIBLE (A)	MINOR (B)	MAJOR (C)	HAZARDOUS (D)	CATASTROPHIC (E)
FREQUENT (5)	5 A	5 B	5 C	5 D	5 E
OCCASIONAL (4)	4 A	4 B	4 C	4 D	4 E
REMOTE (3)	3 A	3 B	3 C	3 D	3 E
IMPROBABLE (2)	2 A	2 B	2 C	2 D	2 E
EXTREMELY IMPROBABLE (1)	1 A	1 B	1 C	1 D	1 E

SAFETY RISK TOLERABILITY MATRIX		
SUGGESTED CRITERIA	ASSESSMENT RISK INDEX	SUGGESTED CRITERIA
	5 B, 5 C, 5 D, 5 E, 4 C, 4 D, 4 E, 3 D, 3 E	Unacceptable under the existing circumstances
	5 A 4 B 3 C 2 D, 2 E	Acceptable based on risk mitigation. It may require management decision
	3 A, 3 B 2 A, 2 B, 2 C 1 A, 1 B, 1 C, 1 D, 1 E	Acceptable

RISK MATRIX

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RISK PROBABILITY	**MEANING**	**VALUE**
FREQUENT	**Likely to occur many times** (has already occurred in the company (Freq. > 3 x year). Has occurred frequently in the history of the aviation industry)	**5**
OCCASIONAL	**Likely to occur sometimes** (has already occurred in the company (Freq. < 3 x year). Has occurred infrequently in the history of the aviation industry)	**4**
REMOTE	**Unlikely to occur, but possible** (has already occurred in the company at least once. Has regularly occured in the history of the aviation industry)	**3**
IMPROBABLE	**Very unlikely to occur** (not known to have occurred in the company but has already occurred at least once in the history of the aviation industry)	**2**
EXTREMELY IMPROBABLE	**Almost inconceivable that the event will occur** (it has never occurred in the history of the aviation industry)	**1**

SAFETY RISK SEVERITY TABLE					
SEVERITY OF OCCURRENCE	**MEANING**				**VALUE**
	PERSONNEL	**ENVIRONMENT**	**MATERIAL**	**IMAGE**	
CATASTROPHIC	Multiple fatalities	Massive effects (pollution, destruction, etc.)	Damage> 1 M€	International impact	**E**
HAZARDOUS	Fatality	Effects difficult to repair	Damage< 1 M€	National impact	**D**
MAJOR	Serious injuries	Noteworthy local effects	Damage< 250K€	Considerable impact	**C**
MINOR	Slight injuries	Little impact	Damage< 50K€	Limited impact	**B**
NEGLIGIBLE	Superficial or no injuries	Negligible or no effects	Damage < 10K€	Light or no impact	**A**

HAZARD - STAFF & REGULATIONS

Updated By: Jorge Santos
On: 16/05/2017

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments
RH-01	22/05/2017	Pre-requisite for the recruitment of pilots in general	Lack of experience which may lead to a loss of control of the situation in flight	Remote	Major	Tolerable	Establish high experience criteria on the types of aircraft used, for commercial operation (or equivalent)	Improbable	Major	Acceptable	Y	Y	OM PART D	
RH-02	22/05/2017	Accumulation of the type ratings	Multiplication in the number of accreditations which need to be kept updated, creating difficulties in maintaining these qualifications. Loss of expertise sometimes caused by periods of flight interruption on an aircraft of the same type	Remote	Major	Tolerable	Specialise pilots in certain types of aircraft	Improbable	Major	Acceptable	Y			Only high experienced pilots are flying two airplanes.
RH-03	22/05/2017	Accumulation of specific mission qualifications or Classe D airports	Loss of expertise caused between the periods interrupting two same missions	Remote	Major	Tolerable	Schedule regular refresher sessions on these types of mission or Airports	Improbable	Major	Acceptable				
RH-04	22/05/2017	Retaining qualifications	No monitoring of the renewing of qualification which may lead to withdrawal of a qualification, therefore a delay in providing services, with the work load being passed on to other staff (increased fatigue)	Remote	Major	Tolerable	Produce a file for follow up qualification and refresher courses for staff with associated alarms	Improbable	Major	Acceptable	Y	Y	AIMS	
RH-05	22/05/2017	Maintaining skills	Forgetting to plan non-recurrent training missions leading to a loss of qualification or competence.	Remote	Major	Tolerable	Produce a file for follow up qualification and refresher courses for staff with associated alarms.	Improbable	Major	Acceptable	Y	Y	AIMS	
RH-06	22/05/2017	Pre-requisite for the recruitment of technicians	Lack of experience which may lead to an inferior quality of teaching provided	Remote	Minor	Acceptable	Establish minimum experience criteria on the types of aircraft used, for commercial operation (or equivalent)	Improbable	Minor	Acceptable				
RH-07	22/05/2017	Designation of the crew member (excluding flight crew)	Boarding of staff who are not qualified or not familiar with this type of flight which may lead to a degradation of the flight safety (staff falling through the door, lack of communication between crew, etc.)	Remote	Hazardous	Unacceptable	Need to organise the selection of this type of staff based on strict criteria such as past experience, qualification held in the past, motivation, interview with the head pilot, formalisation of the employment of this type of staff in this position, insurance, etc.	Improbable	Hazardous	Tolerable				
RH-08	22/05/2017	Maintaining the crew member skills	Loss of expertise of the crew member which may lead to a degraded flight situation	Remote	Major	Tolerable	Production of a training and refresher course plan including annual checks (for example)	Improbable	Major	Acceptable				
RH-09	22/05/2017	Designation of the staff participating in external load carrying missions	Use of untrained staff unfamiliar with this type of operation, which may create a degraded flight situation or cause injury to a member of the ground team.	Remote	Hazardous	Unacceptable	Need to organise the selection of this type of staff based on strict criteria such as past experience, qualification held in the past, motivation, interview with the head pilot, formalisation of the employment of this type of staff in this position, insurance, etc.	Improbable	Hazardous	Tolerable				

HAZARDS - HUMAN FACTORS

Updated By: Jorge Santos
On: 16/05/2017

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments
FH-01	22/05/2017	Composition of the crew - copilot	Pre-requisites or past experience insufficient for the type of mission and can creat a hazardous situation	Remote	Major	Tolerable	Search as far upstream as possible for information on the copilot's experience and report to the chief pilot as soon as possible for inclusion in the staff planning preparation	Improbable	Major	Acceptable				Chief Pilot
FH-02	22/05/2017	Composition of the crew - captain	Although holding an up-to-date type rating, the captain may not have the necessary experience nor the expertise required for the pre-requisites of the copilot	Remote	Major	Tolerable	Systemic inclusion of the captain criteria when producing provisional staff planning	Improbable	Major	Acceptable				
FH-03	22/05/2017	Fatigue - Pilot - day activity	The high number of flight slots during the day affects the pilot's level of vigilance and alters the safe execution of the flight	Remote	Major	Tolerable	Determination of the extent of the work and flying time for the Pilot, with associated rest period. Provide rest areas.	Improbable	Major	Acceptable	Y	Y	AIMS/FAID	
FH-04	22/05/2017	Fatigue - Pilot - night flights	Vigilance in night flights or in a simulator is altered by unsuitable rest periods before and after the flight	Remote	Hazardous	Unacceptable	Determination of the extent of the work and flying time for the pilot, with associated rest period	Improbable	Hazardous	Tolerable	Y	Y	AIMS/FAID	
FH-05	22/05/2017	Fatigue - Pilot - night flights	Fatigue and hypovigilance caused by late flights or simulator slots may be the cause of car accidents on the journey home or to their accommodation (along with the time difference).	Remote	Hazardous	Unacceptable	Provide the possibility of calling an alternative means of transport (taxi, chauffeur, etc.)	Improbable	Negligible	Acceptable				
FH-06	22/05/2017	Fatigue - Pilot - time difference	Vigilance during flights is altered by the time difference and the absence of sufficient time to acclimatise before the start of the flights	Remote	Major	Tolerable	Determination of the extent of the work and flying time for the pilot, with associated rest period	Improbable	Major	Acceptable				
FH-07	22/05/2017	Fatigue - Maintenance and runway technician - day activity	The high number of slots during the day affects the level of vigilance of the technicians and alters their ability to conduct their task in safe conditions	Remote	Major	Tolerable	Determination of the extent of the work with associated rest period	Improbable	Major	Acceptable				
FH-08	22/05/2017	Fatigue - Maintenance and ramp technician - night flights	Fatigue and hypovigilance caused by late or nocturnal activity may be the cause of car accidents on the journey home or to their accommodation (along with the time difference).	Remote	Hazardous	Unacceptable	Provide the possibility of calling an alternative means of transport (taxi, chauffeur, etc.)	Improbable	Negligible	Acceptable				
FH-09	22/05/2017	Fatigue - Maintenance technician - time difference	Vigilance is altered by the time difference and the absence of sufficient time to acclimatise before the start of the activity	Remote	Major	Tolerable	Determination of the extent of the work and flying time, with associated rest period	Improbable	Major	Acceptable				
FH-10	22/05/2017	Fatigue - Ramp technician - time difference	Vigilance and concentration are altered by the time difference and the absence of sufficient time to acclimatise before the start of the activity	Remote	Major	Tolerable	Determination of the extent of the work and flying time, with associated rest period	Improbable	Major	Acceptable				
FH-11	22/05/2017	Sensory illusions	Flight after a Full Flight Simulator session leading to sensory illusions	Remote	Hazardous	Unacceptable	Determination of a minimum time for which flying is prohibited after an FFS session	Improbable	Hazardous	Tolerable				
FH-12	22/05/2017	No synergy or poor synergy of the crew	Crew members not trained in crew work techniques	Remote	Major	Tolerable	Training of the crew members in CRM	Improbable	Major	Acceptable	Y	Y		CRM
FH-13	22/05/2017	Strained relations between members of the team or the crew	Alteration in communication prejudicial to flight safety	Remote	Major	Tolerable	Chief pilot may decide to change crew composition.	Improbable	Major	Acceptable				
FH-14	22/05/2017	Excessive reactions on the controls by the pilot flying	Excessive manoeuvres, which may result from the competence of the pilot flying and which may lead to a loss of control of the aircraft	Remote	Hazardous	Unacceptable	Try to detect "excessive" behaviour by company pilots. Implement a program. Insist on standardisation during briefings and during retraining sessions.	Improbable	Major	Acceptable				
FH-15	22/05/2017	Flight training: inappropriate reaction by the trainee	The instructor may be surprised by an unexpected reaction by the trainee. This event is more Tolerable if it occurs close to the ground and during delicate piloting phases.	Remote	Hazardous	Unacceptable	On training provide a reminder during the pre-flight briefing of the criteria for the instructor taking manual control (standardisation manual). Consider to take on board a 3rd crew member who will monitor and help on the conducting of the flight.	Improbable	Hazardous	Tolerable				

HAZARDS - HUMAN FACTORS

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments
FH-16	16/05/2017	Stress, anxiety - Captain	Loss of the mental resources required for safe operation of flights	Remote	Major	Tolerable	Implementation of the system for detecting and taking into account this type of problem, support to staff who are victims of this phenomenon	Improbable	Major	Acceptable				
FH-17	16/05/2017	Stress, anxiety - Copilot	Loss of the mental resources required for safe operation of flights	Remote	Major	Tolerable	Implementation of the system for detecting and taking into account this type of problem, support to staff who are victims of this phenomenon	Improbable	Major	Acceptable				
FH-18	16/05/2017	Stress, anxiety, panic - Passenger in flight	Disruption of the flight, attention of the crew, the pilot preoccupied with a passenger distracting them from controlling the aircraft.	Remote	Major	Tolerable	Implementation of the system for detecting and taking into account this type of problem, support to staff who are victims of this phenomenon	Improbable	Major	Acceptable				
FH-19	22/05/2017	Indiscipline during flight - captain	Violation, which may jeopardise the safety of the flight	Remote	Major	Tolerable	Strict respect for the OPS manual, SOPs, check-list, ATC instructions and instruction programs	Improbable	Major	Acceptable				
FH-20	22/05/2017	Indiscipline during flight - copilot	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	Strict respect for the OPS manual, SOPs, check-list, ATC instructions and instruction programs	Improbable	Major	Acceptable				
FH-21	22/05/2017	Indiscipline during flight - trainee	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	Strict respect for the OPS manual, SOPs, check-list, ATC instructions and instruction programs	Improbable	Major	Acceptable				
FH-22	22/05/2017	Indiscipline during flight - crew member	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	Strict respect for the OPS manual, SOPs, check-list, ATC instructions and instruction programs	Improbable	Major	Acceptable				
FH-23	22/05/2017	Excessive confidence - captain	Violation which may jeopardise the safety of the flight	Remote	Major	Tolerable	HF and CRM training	Improbable	Major	Acceptable	Y	Y		CRM
FH-24	22/05/2017	Excessive confidence - copilot	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	HF and CRM training	Improbable	Major	Acceptable	Y	Y		CRM
FH-25	22/05/2017	Excessive confidence - trainee	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	HF and CRM training	Improbable	Major	Acceptable	Y	Y		CRM
FH-26	22/05/2017	Excessive confidence - crew member	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	HF and CRM training	Improbable	Major	Acceptable	Y	Y		CRM
FH-27	16/05/2017	Unacceptable behaviour of a passenger (failure to respect safety instructions)	On the ground, may disturb the crew and the other passengers. During a flight, may disturb the flight, distract the crew and put safety at risk.	Occasional	Minor	Tolerable	Before the flight, calm the passenger and explain to them that they must respect the instructions or be removed from the aircraft. During a flight, try to reason with them. If this is not possible, cut short the flight and have them removed from the aircraft	Occasional	Negligible	Acceptable				
FH-28	16/05/2017	Personal problems of crew members	Loss of the mental resources required for safe operation of flights	Remote	Major	Tolerable	Implementation of the system for detecting and taking into account this type of problem, support to staff who are victims of this phenomenon	Remote	Minor	Acceptable				
FH-29	22/05/2017	Self-medication - Crew member, maintenance staff	Alteration of the mental state prejudicial to the safe completion of flights	Remote	Major	Tolerable	Establish procedures in this domain, reminding of the dangers relating to self-medication and the fact that it is prohibited to fly in such cases. Consultation with the medical department for medical care	Remote	Minor	Acceptable				
FH-30	16/05/2017	Drugs, alcohol - crew member, maintenance staff…	Alteration of the mental state prejudicial to the safe completion of flights	Remote	Hazardous	Unacceptable	Blood-alcohol level zero for flying, drug use prohibited in all cases	Ext Improbable	Hazardous	Acceptable				
FH-31	16/05/2017	Hypoxia	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Establish the maximum flight ceiling criteria for routine training flights. If necessary, take on board oxygen systems (masks + bottles)	Improbable	Major	Acceptable				
FH-32	16/05/2017	Hypothermia	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Provide cold weather clothing and flight equipment to the crews.	Improbable	Major	Acceptable				

HAZARDS - HUMAN FACTORS

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FH-33	16/05/2017	Heatstroke	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Establish temperature and hygrometry criteria for completing flights	Improbable	Major	Acceptable				
FH-34	16/05/2017	Dehydration	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Establish temperature and hygrometry criteria for completing flights	Improbable	Major	Acceptable				
FH-35	16/05/2017	Food poisoning	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	In situ, respect the basic rules of caution and hygiene with regard to food in exotic countries. Do not eat the same meal as the other flight crew member.	Improbable	Major	Acceptable				
FH-36	16/05/2017	Other illnesses..	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Keep vaccinations up-to-date. Do not go on flight if symptoms of illness appear (fever, sweating, shivering, etc.). Contact a doctor as soon as possible.	Improbable	Major	Acceptable				
FH-37	16/05/2017	Injuries due to collision, impact, burns, etc. - teaching on the ground	Alteration of the physical and mental state prejudicial to the health of the individual	Remote	Major	Tolerable	Respect for the rules on safety and use of the workstation defined in the HSE documentation	Remote	Minor	Acceptable				
FH-38	22/05/2017	Barotrauma	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Do not fly with a cold. If in pain, interrupt the descent (or even climb back up). Descend balancing of internal and external pressure	Remote	Minor	Acceptable				
FH-39	22/05/2017	Commercial, hierarchical, etc. pressure	Commercial pressure taking precedence over safety essentials	Remote	Hazardous	Unacceptable	The Accountable Manager must agree not to place economic aspects ahead of safety essentials.	Improbable	Hazardous	Tolerable				
FH-40	22/05/2017	Time pressure	Time pressures, urgent need to complete the mission taking precedence over safety essentials	Remote	Hazardous	Unacceptable	Establish strict criteria on this point. The head of Ops will make any decision (cancellation, postponement of training) if necessary, the CEO will do so as a last resource	Improbable	Hazardous	Tolerable				
FH-41	22/05/2017	Accumulation of fatigue	The total of the number of flights, their extent and the number of working days causes the accumulation of fatigue which may harm the health of the individual	Remote	Major	Tolerable	Determination of the number of days worked with maximum daily, weekly and monthly working periods	Improbable	Major	Acceptable				
FH-42	22/05/2017	Errors, unsafe acts	Incidents, Tolerable incidents, accidents, etc.	Frequent	Major	Unacceptable	Implementation of a system of Feedback, information to the HF, CRM, SMS, etc.	Remote	Major	Tolerable	Y	Y		SMS/IQSMS

HAZARD - WORK-MISSION ENVIRONMENT

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On: 16/05/2017

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments
ENV-01	16/05/2017	Overwater flight	Forced water landing, panic when evacuating the aircraft, survivability in maritime environment	Improbable	Catastrophic	Tolerable	Carrying and wearing if necessary rescue equipment (life rafts, life vests, waterproof flight suits, etc.) Pre-flight safety briefing compulsory if transporting passengers	Improbable	Major	Acceptable				
ENV-02	22/05/2017	Flying over inhospitable regions (desert, polar, mountain, rainforest, etc.)	Forced landing, panic when evacuating the aircraft, survivability in hostile environment	Improbable	Catastrophic	Tolerable	Carrying and wearing if necessary rescue equipment adapted to the inhospitable region over which you are flying. Pre-flight safety briefing compulsory if transporting passengers. Plan escape routes with as many collection areas as possible. Fly at highest altitude possible over remote areas to have more time to apply the emergency procedures, pass on the distress message and choose a landing zone	Improbable	Major	Acceptable	Y	Y	OM PART C	
ENV-03	22/05/2017	Flying over urban or peri-urban areas	Little or no possibility of emergency landing in the event of engine failure.	Remote	Catastrophic	Unacceptable	Respect the regulations in force. Use the engine out procedures if published or brief one if not published.	Improbable	Catastrophic	Tolerable				
ENV-04	16/05/2017	Density altitude	Too high, deterioration of performances. Too Remote, mechanical constraints.	Remote	Major	Tolerable	Compulsory determination of flight performances. For non-routine flights, use a pre-flight risk assessment.	Improbable	Major	Acceptable				
ENV-05	22/05/2017	Flying period (dawn, morning, afternoon, dusk, night)	The combination of a reduction in visibility and a reduction in the level of vigilance may be prejudicial to flight safety	Remote	Major	Tolerable	Sufficient rest period before start of flight. In the pre-flight briefing, provide a reminder of the dangers linked to this type of flight (change of brightness, remote sun, rapidly decreasing horizontal visibility, etc.)	Improbable	Major	Acceptable				
ENV-06	22/05/2017	Flight conditions (VMC, IMC)	May lead to an inadvertent entry to IMC	Remote	Catastrophic	Unacceptable	Determination of an emergency procedure to define conduct when faced with this kind of event. During simulator training, carry out an exercise on the subject. Establish minimum weather conditions for making flights depending on their nature.	Improbable	Catastrophic	Tolerable				
ENV-07	22/05/2017	Icy conditions	May lead to a rapid degradation of flight performances and a catastrophic situation.	Remote	Catastrophic	Unacceptable	Annual reminder of flying in icy conditions and how to avoid icy conditions for aircraft which have not been de-iced (OPS manual). Schedule: pre-flight visit, use of de-icing and anti-icing systems, icing and associated dangers, operations at temperatures below 10 degrees and in snowy conditions, etc.) Flights in icy conditions will only take place with aiplanes equipped and certified for the flight in icy conditions (OPS manual). The flying time in these conditions will be restricted to a minimum.	Improbable	Catastrophic	Tolerable	Y	Y		OM PART A
ENV-08	22/05/2017	Heavy rain, hail	May lead to engine flameout or structural damage to the aircraft	Remote	Catastrophic	Unacceptable	Before the flight, study the weather forecast in particular. In flight and in IMC, avoid suspect cloud formations.	Improbable	Catastrophic	Tolerable				
ENV-09	22/05/2017	Strong winds, turbulence, windshear	May lead to structural damage to the aircraft by load factor, may also lead to a loss of control during flight	Remote	Catastrophic	Unacceptable	Establish minimum criteria for making flights. Before the flight, study the weather forecast in particular. Do not hesitate to cancel or delay the flight if necessary. Parking of aircraft: carry the fly-away kit (lashings, blade slings, shutters, etc.)	Improbable	Catastrophic	Tolerable				
ENV-10	16/05/2017	Snow	May lead to a rapid degradation of horizontal visibility, flight performances (icing) and a catastrophic situation (loss of control, inadvertent entry to IMC, etc.)	Remote	Catastrophic	Unacceptable	On an equipped aircraft, provide a reminder during the pre-flight briefing on how to use the anti-icing system. Provide a reminder during the crew safety briefings on the dangers linked to this type of flight. Establish minimum criteria for making flights. Parking of aircraft: carry the fly-away kit (lashings, blade slings, shutters, etc.)	Improbable	Catastrophic	Tolerable				
ENV-11	22/05/2017	Outside temperatures (hot, cold)	Leads to limitations in the implementation and operation of the aircraft. Leads to a drop in the physical and intellectual performances of the crew without suitable protective clothing.	Remote	Major	Tolerable	Compulsory determination of flight performances. For non-routine flights, use a pre-flight risk assessment. For preparation crews and staff, equip with suitable protective gear (cold weather). In hot weather, only operate under certain outdoor temperatures compatible with the scheduled training session and the scope of the work.	Remote	Minor	Acceptable				
ENV-12	16/05/2017	Humidity	Leads to a drop in the physical and intellectual performances of the crew without suitable recovery measure.	Remote	Major	Tolerable	In hot weather, only operate under certain outdoor temperatures compatible with the scheduled training session and the scope of the work. For off-site training, use a pre-flight risk assessment to review their physical and physiological condition and that of their crew	Remote	Minor	Acceptable				

HAZARD - WORK-MISSION ENVIRONMENT

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments
ENV-13	16/05/2017	Saline atmosphere	Leads to corrosion on the aircraft and the equipment	Remote	Major	Tolerable	Ensure that the aircraft is properly rinsed each evening after the last flight.	Remote	Minor	Acceptable				
ENV-14	22/05/2017	Sandy atmosphere	Leads to damage to engine performance without suitable protection, leads to damage to the aircraft due to the effects of abrasion	Remote	Major	Tolerable	Position the anti-sand protection when the aircraft is at the parking point. Check that maintenance carries out the engine control operations.	Remote	Minor	Acceptable				
ENV-15	22/05/2017	Volcanic dust	Leads to considerable degradation on the engines	Remote	Hazardous	Unacceptable	Apply the most recent recommendations plus aircraft engine manufacturer documentation.	Improbable	Hazardous	Tolerable				
ENV-16	16/05/2017	White out/White snow during take-off and landing	May lead to a loss of visual reference and therefore a loss of control of the aircraft	Remote	Hazardous	Unacceptable	Pay close attention when flying over snow or sandy environments. Deal with this point during the pre-flight briefing. Describe the procedure to be applied if this phenomenon occurs (announcements, task distribution, etc.)	Improbable	Major	Acceptable				
ENV-17	16/05/2017	VORTEX	May lead to a loss of control of the aircraft	Remote	Hazardous	Unacceptable	Training flight: familiarise the trainees with this phenomenon. Describe it during the lessons (conditions in which it appears, effects, how to prevent it, how to get out of it, etc.). For the other missions, monitor the flight conditions and the behaviour of the aircraft when approaching VORTEX entry conditions	Improbable	Hazardous	Tolerable				
ENV-18	16/05/2017	Bird strike	Collision in flight likely to cause structural damage, piping failures, engine shutdown, injuries to persons occupying the aircraft	Remote	Hazardous	Unacceptable	Bird strike hazard control policy of the parking base (rockets, bird scarers, hunting, etc.). Switch on the lights and RADAR during take-off and landing.	improbabl	Hazardous	Tolerable				

HAZARD - MAINTENANCE-PREPARATION

Updated By: Jorge Santos
On: 16/05/2017

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments
TEC-01	22/05/2017	Failure to hold a qualification to declare an approval for return to service.	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	Ensure that the staff have a current licence	Improbable	Major	Acceptable				
TEC-02	22/05/2017	Maintenance qualification or licence expired	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	In addition to the item above, put in place a training program	Improbable	Major	Acceptable				
TEC-03	22/05/2017	Lack of maintenance staff	The lack of staff leads to an increase in the workload of the other technicians, which is a source of errors and infractions.	Remote	Catastrophic	Unacceptable	If the company has a Part 145 approval, this guarantees this standard.	Improbable	Major	Acceptable				
TEC-04	16/05/2017	Work documentation not understood by maintenance staff (translation, etc.)	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	Ensure that the maintenance staff have a good knowledge of the language in which the maintenance documents are written. Train them if necessary.	Improbable	Major	Acceptable				
TEC-05	16/05/2017	Work documentation not up-to-date	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	ensure that the maintenance staff use up-to-date work documentation. If the company has a Part 145 approval, this should guarantee this standard.	Improbable	Major	Acceptable				
TEC-06	16/05/2017	Delay in the application of the OEM recommendations	A delay in the application of recommendations or instructions from the OEM can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	Ensure that the maintenance staff apply the recommendations of the OEMs. If the company has a Part 145 approval, this should guarantee this standard.	Improbable	Major	Acceptable				
TEC-07	16/05/2017	Technical log book incorrectly completed, incomplete	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	Ensure before the start of the flights that the aircraft log book is correctly completed and counter-signed by the person responsible for the take-off.	Improbable	Major	Acceptable				
TEC-08	16/05/2017	Airworthiness certificate or equivalent not up-to-date or missing	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	Ensure that the aircraft has an up-to-date airworthiness certificate (CDN) (or equivalent)	Improbable	negligible	Acceptable				
TEC-09	16/05/2017	MEL incomplete or missing	Inaccuracy with regard to the choice of action in the event of the failure of a component or system may lead to a potentially hazardous situation	Remote	Hazardous	Unacceptable	Ensure that the aircraft has an up-to-date MEL.	Improbable	negligible	Acceptable	Y	Y		
TEC-10	16/05/2017	No flight manual on board the aircraft, flight manual not up-to-date	Inaccuracy with regard to the determination of the flight performances, normal and emergency procedures to be applied may lead to a potentially hazardous situation	Remote	Hazardous	Unacceptable	Check that an easily accessible and up-to-date flight manual is present on board the aircraft	Improbable	negligible	Acceptable				
TEC-11	16/05/2017	Body or aircraft not insured	The staff may be blamed in the event of an incident/accident.	Remote	Hazardous	Unacceptable	Ensure that the aircraft is insured for the activity concerned	Improbable	negligible	Acceptable				
TEC-12	16/05/2017	Maintenance premises unsuitable (insufficient lighting, heating, protection against weather conditions, no soundproofing)	May be a contributing factor to a maintenance error	Remote	Hazardous	Unacceptable	Ensure that the safety of the premises is of an acceptable standard. If the company has a Part 145 approval, this should guarantee this standard.	Improbable	negligible	Acceptable				
TEC-13	16/05/2017	Foreign Object Damage	May lead to a loss of engine in flight, deterioration of Hazardous assemblies	Remote	Hazardous	Unacceptable	Ensure that the body has an FOD prevention program. If the company has a Part 145 approval, this should guarantee this standard. Before the flights, ensure that the start-up area is clean and clear. Pay particular attention to the pre-flight inspection.	Improbable	negligible	Acceptable				
TEC-14	16/05/2017	Use of non-compliant parts (forgeries, repairs not inspected by a quality department, etc.)	May lead to a failure of a system during flight, or even a mechanical disruption which may lead to an emergency or distress situation (loss of control during flight)	Improbable	Catastrophic	Unacceptable	Ensure that the body has a service for the management of parts, systems and assemblies. In general, ensure that parts which are not airworthy are identified as such and stored in a secure room to ensure they are not used. If the company has a Part 145 approval, this guarantees this standard.	Improbable	negligible	Acceptable				

HAZARD - MAINTENANCE-PREPARATION

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments
TEC-15	16/05/2017	Lifting apparatus poorly maintained or not maintained (workshop crane, overhead crane, jacks, slings, pedals)	May lead to a load falling on staff. Injury or fatality caused by crushing	Remote	Hazardous	Unacceptable	Ensure that the body has such equipment available. The Hangar manager should ensure their monitoring and maintenance. If the company has a Part 145 approval, this should guarantee this standard. Before use, ensure the good general condition of the step-ladders (chocks, protection, etc.). Use harnesses when working at heights.	Improbable	minor	Acceptable				
TEC-16	16/05/2017	Fall of heavy object (mechanical assembly element)	Injury, fatality caused by crushing	Remote	Hazardous	Unacceptable	The heavy mechanical assembly elements are fixed on specific ad-hoc supports. The staff must wear safety boots.	Improbable	minor	Acceptable				
TEC-17	16/05/2017	Lack of step-ladder or gantry	Due to unease, the staff may cause errors or infractions in the maintenance operations. The staff may also fall from the aircraft. Damage model by pressing inappropriate areas - Fault in educational demonstration.	Remote	Hazardous	Unacceptable	Ensure that the body has such equipment available. The Hangar manager should ensure their monitoring and maintenance. If the company has a Part 145 approval, this should guarantee this standard. Before use, ensure the good general condition of the step-ladders (chocks, protection, etc.). Use harnesses when working at heights.	Improbable	minor	Acceptable				
TEC-18	16/05/2017	No auxiliary engine starting system - Flight	Startup on a main battery only may lead to degradation of the performances of the electric system, or even a breakdown.	Remote	Major	Tolerable	Give preference, whenever possible, to startup on ground power unit.	Improbable	Major	Acceptable				
TEC-19	16/05/2017	No auxiliary engine starting system - Ground	The absence of an external electrical power source may have a damaging effect on the quality of the ground teaching provided and lead to the deterioration of the start-up system if the practice continues.	Remote	Major	Tolerable	Proceed with the repair (obviously)	Improbable	Major	Acceptable				
TEC-20	16/05/2017	Pressurised hydraulic circuit (aircraft and hydraulic generation bench and Hydraulic block model)	Injury by pressurised hydraulic projection	Remote	Major	Tolerable	The hydraulic systems of the benches should be equipped with safety systems compliant with the standards. The hydraulic generation benches should be checked periodically	Improbable	Major	Acceptable				
TEC-21	16/05/2017	Common use of products, corrosive, toxic or flammable liquids	corrosive and allergenic hydraulics, PR resins, flammable products	Remote	Major	Tolerable	Storage of products and ingredients in secure premises, in suitable and identified packaging. Handling of products by trained staff only and wearing PPE	Improbable	Major	Acceptable				
TEC-22	22/05/2017	Lack of ingredients (oil, hydraulics, etc.)	The failure to supplement the systems concerned may lead to a potentially hazardous situation in flight through a system, engine or component failure	Remote	Hazardous	Unacceptable	Ensure that the aircraft has such ingredients available. If the company has a Part 145 approval, this should guarantee this standard.	Improbable	negligible	Acceptable				
TEC-23	16/05/2017	Fuel not adapted to this type of engine or use (anti-icing, etc.)	Loss of engine power in flight	Improbable	Hazardous	Tolerable	Ensure during flight preparation that on the ground at the destination or the stopover, there is a fuel delivery service providing suitable fuel	Improbable	Nil	Acceptable				
TEC-24	22/05/2017	Polluted fuel	Loss of engine power in flight	Improbable	Hazardous	Tolerable	Ensure during flights that the fuel has been tested before filling up.	Extr. Improbable	Hazardous	Acceptable				
TEC-25	16/05/2017	Error in the quantity of fuel taken on	Loss of engine power in flight. Error in the calculation of the minimum fuel quantity or error in the quantity provided by the delivery organisation.	Improbable	Hazardous	Tolerable	Counter-check the calculation of the minimum fuel quantity and counter-check the quantity of fuel taken on.	Extr. Improbable	Hazardous	Acceptable				
TEC-26	16/05/2017	Fuel spillage during refuelling operations	Pollution, risk of fire during the start-up	Remote	Major	Tolerable	Ensure that the parking platform has a service for cleaning and recovery of polluting fluids; Move the aircraft before the start-up.	Improbable	Major	Acceptable				
TEC-27	16/05/2017	Absence of a dedicated parking zone, on start-up of aircraft	Reduction in the safety spacing between aircraft on start-up, on taxiing, in relation to obstacles, etc.	Remote	Major	Tolerable	Before start-up, ensure the minimum space between aircraft, and between the aircraft and any obstacles. Do not hesitate to move the aircraft if necessary.	Improbable	Major	Acceptable				
TEC-28	16/05/2017	Absence or lack of marking, beacons on the ground (parking, taxiing, etc.) or traffic area.	Reduction in the safety spacing between aircraft on start-up, on taxiing, in relation to obstacles, etc.	Remote	Major	Tolerable	Specific vigilance during start-up and displacement phases. Mention this during the pre-flight briefing (distribution of visual surveillance)	Improbable	Major	Acceptable				
TEC-29	16/05/2017	Parking zone not protected and left open for access to all (vehicles, pedestrians, animals, etc.)	Risk of collision with vehicles, pedestrians, animals, etc.	Remote	Major	Tolerable	Specific vigilance during start-up and displacement phases. Mention this during the pre-flight briefing (distribution of visual surveillance)	Improbable	Major	Acceptable				
TEC-30	16/05/2017	Workshop untidy	Risk of tripping or bumping into things when moving around	Remote	Major	Tolerable	The hangar manager must constantly ensure the correct storage of the models and benches. Staff must be made aware of the problem	Improbable	Major	Acceptable				
TEC-31	16/05/2017	Electrical circuits of the models and benches	electrocution	Remote	Major	Tolerable	The electrical systems of the models and benches should be equipped with protection and safety systems compliant with the standards.	Improbable	Major	Acceptable				

HAZARD - MAINTENANCE-PREPARATION

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments
TEC-32	16/05/2017	Stove ovens, hydraulic presses, machine tools from mechanical and composite workshops	Injuries by burning, crushing, cutting.	Remote	Major	Tolerable	The use of this equipment is restricted to qualified staff. For training, it should always be carried out under the supervision of the instructor	Improbable	Major	Acceptable				
TEC-33	16/05/2017	Pitot probes	burns to hands	Remote	Major	Tolerable	The Pitot probes should have appropriate protection. Employees must wear PPE	Improbable	negligible	Acceptable				
TEC-34	16/05/2017	Electrical hatch, FLADUNG	injury during handling, cable cut	Remote	Major	Tolerable	Use only by trained staff	Improbable	negligible	Acceptable				
TEC-35	16/05/2017	Failure to respect smoking bans around aircraft safety areas	Danger of fire, explosion	Remote	Major	Tolerable	Respect for internal regulations and specific HSE instructions	Improbable	negligible	Acceptable				
TEC-36	16/05/2017	In hangar,no ground marking showing the aircraft parking and mechanical assembly positions	Risk of tripping or bumping into things when moving around	Remote	Major	Tolerable	Ensure that this type of marking and beacons exists. If not, arrange a location and a route with the platform manager.	Improbable	negligible	Acceptable				
TEC-37	22/05/2017	Detection of anomalies in the manufacturer's documentation	Risk of a maintenance error, of use which may lead to a degradation of the situation.	Occasional	Hazardous	Unacceptable	Definition of an internal procedure to firstly put in place local protective measures (staff information, safety alert, etc.) and secondly to send the information to the manufacturer	Remote	Hazardous	Tolerable				
TEC-38	16/05/2017	Use of mobile phones during refuelling operations	Danger of fire, explosion	Occasional	Hazardous	Unacceptable	Respect for internal regulations and specific HSE instructions	Improbable	negligible	Acceptable				
TEC-39	16/05/2017	Hot Surfaces/Fluides	Hot refreshments, exhaust nozzles, jet pipes, hot components, heated sensors,	Remote	Hazardous	Unacceptable	Respect for internal regulations and specific HSE instructions.	Improbable	negligible	Acceptable				

HAZARD - AERIAL MISSIONS

Updated By: Jorge Santos
On: 16/05/2017

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments
MSN-01	22/05/2017	No information on the route	Delay in completing flights due to lack of information. During flight, safety potentially undermined due to lack of information (near miss, no-flyover zone, disturbances)	Remote	Major	Tolerable	Establish the criteria for determining the route. Inform the client of these criteria to avoid delay in the completion of the service.	Improbable	Major	Acceptable				
MSN-02	16/05/2017	No information about main base	Delay in completing flights due to lack of information. During flight, safety potentially undermined due to lack of information (mid-air collision, no-flyover zone, disturbances)	Remote	Major	Tolerable	Ask the client to specify the reception areas and platforms.	Improbable	Major	Acceptable				
MSN-03	22/05/2017	Lack of aeronautical documentation or incomplete documentation	Delay in the preparation and execution of the flight. Possible penalties, flight safety potentially undermined	Remote	Major	Tolerable	When preparing flights, anticipate aeronautical documentation orders	Improbable	Major	Acceptable				
MSN-04	16/05/2017	Transponder failure	No detection by secondary radar, no longer guarantee that minimum spacing between aircraft is respected, especially in congested area. Risk of mid-air collision.	Remote	Hazardous	Unacceptable	Apply the procedure set out in the national regulations of the country over which you are flying. Provide a reminder of the required conduct in the OPS manual. Depending on the type of flight, insist on this point during the pre-flight briefing.	Improbable	Negligible	Acceptable				
MSN-05	22/05/2017	No NOTAM, ATC, weather information, Bird NOTAM…	Delay in the preparation and execution of the flights. Flight safety potentially undermined (no weather forecasts, nor any information on the ATC situation, etc.)	Remote	Hazardous	Unacceptable	Ensure that there are resources in place to obtain this kind of information. Ensure that this type of resource exists to obtain this type of information en route and on the destination and alternate aerodromes.	Improbable	Negligible	Acceptable				
MSN-06	22/05/2017	No means of filing flight plan	No possibility of informing the air traffic services on the planning for a flight.	Remote	Major	Tolerable	Ensure that there are resources in place to file a flight plan. Ensure that this type of resource exists to allow a flight plan to be filed (printed) on the destination and alternate aerodromes.	Improbable	Negligible	Acceptable				
MSN-07	22/05/2017	No means for activating flight plan	No possibility of informing the air traffic control service of an aircraft movement. No possibility of receiving information and alert services.	Remote	Hazardous	Unacceptable	Ensure that there are resources in place to file a flight plan. Ensure that this type of resource exists to allow a flight plan to be filed (printed) on the destination and alternate aerodromes.	Improbable	Negligible	Acceptable				
MSN-08	22/05/2017	No closure of flight plan	Possibility of triggering search actions from the alert service.	Remote	Major	Tolerable	Ensure that there are resources in place to file a flight plan. Ensure that this type of resource exists to allow a flight plan to be filed (printed) on the destination and alternate aerodromes.	Improbable	Negligible	Acceptable				
MSN-09	22/05/2017	No ATC or Flight Information Service	No information on the other traffic in the area, no real-time control service, delay in triggering a protective measure in the event of an emergency or distress	Remote	Hazardous	Unacceptable	During the pre-flight briefing, insist on this point and the distribution of tasks and surveillance of the skies. During a flight, regular emission of auto-information message. Find an additional way to launch the alert just in case (staff on the ground, notify operations of the conduct required in the event of a delay, etc.)	Improbable	Hazardous	Tolerable				
MSN-10	16/05/2017	No lighting system (night-time flights, IFR, etc.)	Degradation of the conditions for making flights.	Remote	Hazardous	Unacceptable	Determine the minimum weather conditions for making flights. Restriction of flight slots to daytime flights only.	Improbable	Hazardous	Tolerable				
MSN-11	16/05/2017	No SAR organisation	No alert service in the event of an emergency or distress. Delay in rescue operations	Remote	Catastrophic	Unacceptable	Ensure that an SAR service or equivalent exists in the country concerned. Filing of a flight plan or systematic equivalent for completing flights.	Improbable	Major	Acceptable				
MSN-12	16/05/2017	Radio failure in flight	Loss of contact with ATC and other aircraft. Danger of mid-air collision by reduction of safety spaces	Remote	Hazardous	Unacceptable	Apply the procedure set out in the national regulations of the country over which you are flying. Provide a reminder of the required conduct in the OPS manual. Depending on the type of flight, insist on this point during the pre-flight briefing.	Improbable	Negligible	Acceptable				
MSN-13	22/05/2017	Too long distance between the work areas or the airport platforms	Loss of time leading to fatigue	Remote	Hazardous	Unacceptable	Take this data into account when preparing the flights	Extr. Improbable	Hazardous	Acceptable				
MSN-14	22/05/2017	No possibility of refuelling on destination airport	Carrying of additional fuel, possible degradation of flight performances	Frequent	Negligible	Tolerable	Take this data into account when preparing the flights	Remote	Negligible	Acceptable				
MSN-15	16/05/2017	Communication Breakdown between crew or ATC	mid-air collision	Remote	Catastrophic	Unacceptable	The communication systems must be working properly mainly the emergency systems.	Improbable	Catastrophic	Tolerable				

HAZARD - AERIAL MISSIONS

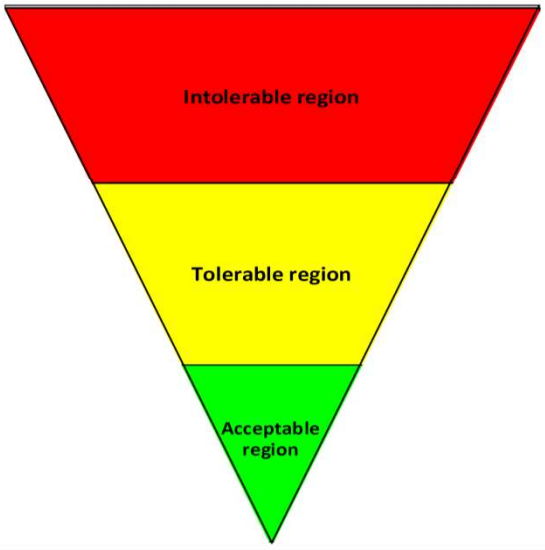
Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments
MSN-16	22/05/2017	Insufficient information on the nature of the load in the hold	Flammable, poorly packaged or suspicious products may be on board	Remote	Catastrophic	Unacceptable	Find out in particular, before the departure, the nature of the load, whether it is compatible with this type of flight and with passenger transport. Obtain all customs and IATA documents required (invoice, packaging status, etc.). Do not hesitate to unload the aircraft if necessary.	Improbable	Catastrophic	Tolerable				
MSN-17	16/05/2017	Insufficient information on the status of the passengers	Uninsured passengers may board after having deceived the captain. Passengers with bad intentions may also be on board (hostage taking)	Improbable	Catastrophic	Unacceptable	Respect internal regulations and the OPS manual on this point. Check the status of the passengers before the start of the flight. Draw up a passenger manifest. Deny boarding in the event of any doubt.	Improbable	Nil	Acceptable				
MSN-18	22/05/2017	Load Sheet errors or missing	Force of habit or lack of time may mean that the crew does not have enough time for this calculation, which may have important repercussions on the determination of flight performances and the controllability of the aircraft	Remote	Hazardous	Unacceptable	Systematically check the loads and the performances before starting the flights. Use the Load Sheet Statement made by the IO.	Improbable	Negligible	Acceptable				
MSN-19	16/05/2017	Error in the configuration of this data in the flight system before the flight	visual	Remote	Hazardous	Unacceptable	Cross-checking of the performance calculations between the crew members + verification of the validity and coherence of the data once entered in the FMS	Improbable	Negligible	Acceptable				
MSN-20	16/05/2017	Error in the configuration of this data in the system during flight	The weights and centre of gravity may be correct, but their entry into the system may contain an error (on entry) under pressures of time, change of route, etc.	Remote	Hazardous	Unacceptable	Cross-checking of the performance calculations between the crew members + verification of the validity and coherence of the data once entered in the FMS	Improbable	Negligible	Acceptable				
MSN-21	16/05/2017	Insufficient time, gaps in the preparation of the mission	Mission insufficiently prepared causing gaps and breaches which may affect the safety of the flight (error in determining the quantity of fuel to take on board) and in training, the quality of the teaching provided	Remote	Hazardous	Unacceptable	Counter-check the calculations of the minimum fuel quantity and performances. In training, it is recommended to postpone the flight if all aspects of the preparation and the briefing have not been covered.	Improbable	Negligible	Acceptable				
MSN-22	22/05/2017	No more fuel usable in flight	Detour, countryside landing, or even engine flameout due to lack of fuel	Remote	Hazardous	Unacceptable	Draw up a strict policy for determining the minimum fuel quantity to take on board for the types of flight concerned. Define a policy for fuel management during the flight.	Improbable	Negligible	Acceptable	Y	Y	SOPS	
MSN-23	16/05/2017	Insufficient time for the pre-flight inspection	Failure to carry out this pre-flight inspection may prevent the detection of an anomaly or failure and jeopardise the safety of the flight.	Remote	Hazardous	Unacceptable	Do not fly if no crew member has made the pre-flight inspection	Improbable	Negligible	Acceptable				
MSN-24	22/05/2017	1st flight in situ.	Mission insufficiently prepared leading to gaps and breaches which may affect flight safety	Remote	Hazardous	Unacceptable	Search for all the information available.	Improbable	Negligible	Acceptable	Y	Y	Pre-Dispatch checlist; OM Part C	
MSN-25	16/05/2017	Runway incursion	Entry into a manoeuvring area when an aircraft is taking off or landing	Remote	Catastrophic	Unacceptable	Reminder in the OPS manual of the need to respect the compulsory stagnation points, the phraseology and the instructions of ground control. On outdoor platforms (national or international), pay particular attention to the radio message and to aircraft on the final leg. Systematically collate the ATC instructions and request confirmation in the event of doubt	Improbable	Catastrophic	Tolerable				
MSN-26	22/05/2017	Reduction in the regulatory minimum flying height	Risk of CFIT	Remote	Hazardous	Unacceptable	Be sure about the Minimum Sector Altitudes, GMORA, RADAR Minimum Altitudes	Improbable	Hazardous	Tolerable				
MSN-27	22/05/2017	In-flight collision	No comment	Remote	Catastrophic	Unacceptable	Favour use of the TCAS. Provide a reminder during the briefing of the distribution of the tasks and the importance of sky surveillance. During a controlled flight (IFR or VFR), respect the published routes and the CTL instructions	Improbable	Catastrophic	Tolerable				
MSN-28	22/05/2017	Unstabilised approach	Hard landings, bounced landings, runway excursions, overspeed flaps	Occasional	Major	Unacceptable	Description, in the standardisation manual, of the procedure for completing IFR and VFR approaches during the day and the night (single- and multi-engine) and the associated go-around criteria in the event of an incorrect presentation.	Remote	Major	Tolerable	Y	Y	SOPS	
MSN-29	16/05/2017	Altimeter setting error	Failure to respect the margins for clearing obstacles, which may lead to a CFIT	Remote	Hazardous	Unacceptable	Definition of a procedure to change the altimeter setting based on the flight phases. Cross-check compulsory between crew members for any change in the altimeter setting or the flight level or altitude. For aircraft equipped with radio altimeter, cross-check to verify the ground height. Make trainees aware of aircraft equipped with EGPWS and TAWS.	Improbable	Hazardous	Tolerable				

HAZARD - AERIAL MISSIONS

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments
MSN-30	22/05/2017	Crew member with build outside certification range (too large or too small, weight, etc.)	Trouble in reaching the normal and emergency controls. No possibility of evacuation of the cabin in the event of a crash	Improbable	Major	Tolerable	Implementation of a solution to reach all the controls. Compulsory training in the emergency evacuation procedures (land and sea)	Improbable	Negligible	Acceptable				
MSN-31	22/05/2017	Passengers with build outside range (too large, too small, weight, etc.) or with reduced mobility	Trouble evacuating the aircraft in the event of an accident. Risk of remaining trapped in the aircraft	Improbable	Major	Tolerable	In addition to the application of the rules for the transport of passengers, insist in particular on the safety briefing, assign them a dedicated space which does not impede the evacuation of the other passengers. Signal their presence in the passenger manifest before departure to notify the rescue teams.	Improbable	Negligible	Acceptable	Y	Y	Cabin Manual	
MSN-32	16/05/2017	Transport of dangerous goods	Risk of fire, explosion during the loading and in flight	Improbable	Catastrophic	Unacceptable	Training staff to handle this type of freight (storage, packaging, stowage standards, safety rules). Respect for IATA regulations. Depending on the nature of the freight, define parking points for the aircraft which are far from the public and infrastructures.	Improbable	Minor	Acceptable	Y	Y	Dangerous Goods Manual	
MSN-33	16/05/2017	Incorrect ATC instructions	Risk of CFIT or mid-air collision	Improbable	Catastrophic	Unacceptable	Counter-check the ATC instructions. In the event of any doubt, request confirmation from the ATC and propose another solution.	Improbable	Negligible	Acceptable				
MSN-34	16/05/2017	Flight at low altitude	This type of demonstration flight (winching, sling, SAR, NVG, etc.) is risky since it is below the regulatory flying height.	Improbable	Hazardous	Tolerable	First obtain dispensation for a nap-of-the-earth flight. Qualify and train the crew for this type of flight, set up a refresher program. Prove to the authorities that this type of flight is controlled (staff training, dedicated evolution areas, selection of staff, etc.)	Improbable	Major	Acceptable				

Annex D – Hazard Identification Log 2019

SAFETY RISK ASSESSMENT MATRIX					
RISK PROBABILITY	RISK SEVERITY				
	NEGLIGIBLE (A)	MINOR (B)	MAJOR (C)	HAZARDOUS (D)	CATASTROPHIC (E)
FREQUENT (5)	5 A	5 B	5 C	5 D	5 E
OCCASIONAL (4)	4 A	4 B	4 C	4 D	4 E
REMOTE (3)	3 A	3 B	3 C	3 D	3 E
IMPROBABLE (2)	2 A	2 B	2 C	2 D	2 E
EXTREMELY IMPROBABLE (1)	1 A	1 B	1 C	1 D	1 E

SAFETY RISK TOLERABILITY MATRIX		
SUGGESTED CRITERIA	ASSESSMENT RISK INDEX	SUGGESTED CRITERIA
	5 B, 5 C, 5 D, 5 E, 4 C, 4 D, 4 E, 3 D, 3 E	Unacceptable under the existing circumstances
	5 A 4 B 3 C 2 D, 2 E	Acceptable based on risk mitigation. It may require management decision
	3 A, 3 B 2 A, 2 B, 2 C 1 A, 1 B, 1 C, 1 D, 1 E	Acceptable

01 - Recruitment

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Reports ID
ORG-01-01	26/04/2019	Pre-requisite for the recruitment of pilots in general	Lack of experience which may lead to a loss of control of the situation in flight	Remote	Major	Tolerable	Establish minimum experience criteria on the types of aircraft used, for commercial operation (or equivalent)	Improbable	Major	Acceptable	Y	Y	OM PART A - 5	N/A	N/A
ORG-01-02	26/04/2019	Pre-requisite for the recruitment of technicians	Lack of experience which may lead to an inferior quality of maitenence works	Remote	Minor	Acceptable	Establish minimum experience criteria on the types of aircraft used, for commercial operation (or equivalent)	Improbable	Minor	Acceptable	Y	Y	NO-PES-001	N/A	N/A
ORG-01-03	26/04/2019	Lack of maintenance staff	The lack of staff leads to an increase in the workload of the other technicians, which is a source of errors and infractions.	Remote	Catastrophic	Unacceptable	If the company has a Part 145 approval, this guarantees this standard.	Improbable	Major	Acceptable	Y	Y	Certificado Part -145	EAA is approval Part-145	N/A
ORG-01-04	26/04/2019	Crew member with build outside certification range (too large or too small, weight, etc.)	Trouble in reaching the normal and emergency controls. No possibility of evacuation of the cabin in the event of a crash	Improbable	Major	Tolerable	Implementation of a solution to reach all the controls. Compulsory training in the emergency evacuation procedures (land and sea)	Improbable	Negligible	Acceptable	Y	Y	Cabin Manual	N/A	N/A

02 - Training

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Reports ID
ORG-02-01	26/04/2019	Accumulation of the type ratings	Multiplication in the number of accreditations which need to be kept updated, creating difficulties in maintaining these qualifications. Loss of expertise sometimes caused by periods of flight interruption on an aircraft of the same type	Remote	Major	Tolerable	Establishment of criteria for operation of more than one variant or type	Improbable	Major	Acceptable	Y	Y	OM A - 5.2.6	Only high experienced pilots are flying two airplanes.	N/A
ORG-02-02	26/04/2019	Accumulation of specific mission qualifications or Classe C airports	Loss of expertise caused between the periods interrupting two same missions	Remote	Major	Tolerable	Establishment of procedures for operating na Category "B" and "C" aerodromes	Improbable	Major	Acceptable	Y	Y	OM C - 2	N/A	N/A
ORG-02-03	26/04/2019	Retaining qualifications	No monitoring of the renewing of qualification which may lead to withdrawal of a qualification, therefore a delay in providing services, with the work load being passed on to other staff (increased fatigue)	Remote	Major	Tolerable	Produce a file for follow up qualification and refresher courses for staff with associated alarms	Improbable	Major	Acceptable	Y	Y	AIMS/JUPITER	AIMS - PN JUPITER - DME	N/A
ORG-02-04	26/04/2019	Maintaining skills	Forgetting to plan recurrent training leading to a loss of qualification or competence.	Remote	Major	Tolerable	Produce a file for follow up qualification and refresher courses for staff with associated alarms.	Improbable	Major	Acceptable	Y	Y	AIMS/JUPITER	AIMS - PN JUPITER - DME	N/A
ORG-02-05	26/04/2019	Designation of the crew member	Boarding of staff who are not qualified or not familiar with this type of flight which may lead to a degradation of the flight safety (staff falling through the door, lack of communication between crew, etc.)	Remote	Hazardous	Unacceptable	Need to organise the selection of this type of staff based on strict criteria such as past experience, qualification held in the past, motivation, interview with the head pilot, formalisation of the employment of this type of staff in this position, insurance, etc.	Improbable	Hazardous	Tolerable	Y	Y	NP-DOV-009	N/A	N/A
ORG-02-06	26/04/2019	Maintaining the crew member skills	Loss of expertise of the crew member which may lead to a degraded flight situation	Remote	Major	Tolerable	Production of a training and refresher course plan including annual checks (for example)	Improbable	Major	Acceptable	Y	Y	OM D - Recurrent and Refresher Training	N/A	N/A
ORG-02-07	26/04/2019	Designation of the staff participating in external load carrying missions	Use of untrained staff unfamiliar with this type of operation, which may create a degraded flight situation or cause injury to a member of the ground team.	Remote	Hazardous	Unacceptable	Need to organise the selection of this type of staff based on strict criteria such as past experience, qualification held in the past, motivation, interview with the head pilot, formalisation of the employment of this type of staff in this position, insurance, etc.	Improbable	Hazardous	Tolerable	Y	Y	NP-DOV-033	N/A	N/A
ORG-02-08	26/04/2019	Failure to hold a qualification to declare an approval for return to service.	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	Ensure that the staff have a current licence	Improbable	Major	Acceptable	Y	Y	NF-03-04	N/A	N/A

ORG-02-09	26/04/2019	Maintenance qualification or licence expired	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	In addition to the item above, put in place a training program	Improbable	Major	Acceptable	Y	Y	MGCA and MPM	N/A	N/A
ORG-02-10	26/04/2019	Work documentation not understood by maintenance staff (translation, etc.)	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	Ensure that the maintenance staff have a good knowledge of the language in which the maintenance documents are written. Train them if necessary.	Improbable	Major	Acceptable	Y	Y	MOP 3.7 e 1.7	N/A	N/A
ORG-02-11	26/04/2019	Inappropriate acknowledgment of external crews	External crew do not comply with the necessary training. Communication between crew members difficult or nearly impossible (lack of knowledge of english language)	Remote	Major	Tolerable	Monitor the training provided	Remote	Minor	Tolerable	Y	Y	NO-SAF-001	SPI Crew Training	#226 #428
ORG-02-12	26/04/2019	DAE operation training	Cabin Crew does not know how to operate DAE in case of na emergency on board. Equipment not in common language (english)	Improbable	Hazardous	Tolerable	Ensure that all SFAs are trained in AEDs and document this formation in training program	Improbable	Hazardous	Tolerable	Y	N	To be documented in OM Part D	N/A	#559
ORG-02-13	26/04/2019	Crew not familiar with the aircraft	Cabin crew not experienced with aircraft type	Improbable	Hazardous	Tolerable	Prepared an AIMS checklist for aircraft familiarization training	Improbable	Major	Acceptable	Y	Y	Safety Alert 02_2018	N/A	#835

03 - Team Composition

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Reports ID
ORG-03-01	26/04/2019	Composition of the crew - copilot	Pre-requisites or past experience insufficient for the type of mission and can creat a hazardous situation	Remote	Major	Tolerable	Search as far upstream as possible for information on the copilot's experience and report to the chief pilot as soon as possible for inclusion in the staff planning preparation	Improbable	Major	Acceptable	Y	Y	NP-DOV-009	Chief Pilot	N/A
ORG-03-02	26/04/2019	Composition of the crew - captain	Although holding an up-to-date type rating, the captain may not have the necessary experience nor the expertise required for the pre-requisites of the copilot	Remote	Major	Tolerable	Systemic inclusion of the captain criteria when producing provisional staff planning	Improbable	Major	Acceptable	Y	Y	NP-DOV-009	Chief Pilot	#1057
ORG-03-03	26/04/2019	Reinforced Crew	Lack of crew members in a flight where crew should be reinforced. It may induce pressure and fatigue in the remain crew.	Improbable	Hazardous	Tolerable	On flights where the hours of service are likely to be extended, the rosters should reinforce the crew	Remote	Minor	Tolerable	In Analysis				#202
ORG-03-04	26/04/2019	Minimum Required Crew	Less crew members than what is necessary in a flight. It may induce pressure and fatigue in the remain crew. It becames difficult to correctly control na emergency situation.	Improbable	Catastrophic	Tolerable	On flights where the hours of service are likely to be extended, the rosters should reinforce the crew	Remote	Minor	Tolerable	In Analysis				#179 #206
ORG-03-05	26/04/2019	Flight without IO	Hanling operation not supervised. Cargo may not be secured/locked.	Improbable	Hazardous	Tolerable	Create SPI related to non-IO flights	Improbable	Hazardous	Tolerable	Y	Y	NO-SAF-001	N/A	N/A

04 - Documentation

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Reports ID
ORG-04-01	26/04/2019	Body or aircraft not insured	The staff may be blamed in the event of an incident/accident.	Remote	Hazardous	Unacceptable	Ensure that the aircraft is insured for the activity concerned	Improbable	negligible	Acceptable	Y	Y	NP-DOV-017	Control of the validity of Ramp Inspection documents	N/A
ORG-04-02	26/04/2019	Document not available in Jupiter	Impossible for emploeeys to check it when needed. Lack of informaton access may lead to erroneous decisions.	Remote	Major	Tolerable	Ensure that documentation is well inserted into Jupiter	Improbable	Minor	Acceptable	In Analysis				#272

ORG-04-03	26/04/2019	Incorrect information in the GENDEC	Deelays the entrance in the airport restricted area. Dispatch workloaded (stops normal operation and need to review all the crew information in a short period of time). Crew may not have the needed time to do the checklist correctly. Increases the probability of human error.	Improbable	Hazardous	Tolerable	Ensure that the information entered in the AIMS complies with the requirements for general dec	Improbable	Minor	Acceptable	In Analysis				#197 #1044
ORG-04-04	26/04/2019	Duplicate document with contradictory information	Decisions made with incorrect information.	Remote	Major	Tolerable	Service provider monitoring	Improbable	Minor	Acceptable	Y	Y	NO-DCM-007	N/A	#102 #372 #578 #862

05 - External Providers

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Reports ID
ORG-05-01	26/04/2019	No aircraft clean service provide	Garbage spread in the cabin. Crew and passengers health not assure, specially in case medical equipment have been used during the flihgt.	Remote	Hazardous	Unacceptable	Service provider monitoring	Remote	Minor	Acceptable	Y	Y	NO-DCM-007	N/A	#228 #245 #407 #839
ORG-05-02	26/04/2019	Handling equipment fails	Flight deelay. Depending on the equipment in question and the operation phase, it can induce technical problems.	Improbable	Major	Acceptable	Monitor Handling equipment	Improbable	Minor	Acceptable	Y	Y	NO-SAF-001	N/A	#291
ORG-05-03	26/04/2019	Catering equipment - oven inserts, troleys	Lack of catering equipement, or the utilization of damaged catering equipment, can lead to emergency situation, like fire or smoke on board.	Remote	Hazardous	Unacceptable	Monitor catering equipment	Remote	Minor	Acceptable	Y	Y	NO-SAF-001	N/A	#302 #303 #316 #402 # 744 #923 #1039
ORG-05-04	26/04/2019	No convinient equipment to disembark the passengers	Can lead to flight deelays or, in some cases, injury passengers.	Improbable	Hazardous	Tolerable	Service provider monitoring	Improbable	Minor	Acceptable	Y	Y	NO-DCM-007	N/A	#162 #404

06 - Employees Necessities

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Reports ID
ORG-06-01	24/04/2019	Transport from/to airport	Emploeeys security may be put on risk.	Improbable	Hazardous	Tolerable	Ensure adequate transport conditions at the time of contract negotiation	Ocassional	Minor	Tolerable	In Analysis				#155 #232 #249 #409 #437 #791 #834
ORG-06-02	24/04/2019	Health Insurance	Emploeey may not have the necessary medical attention in case of an emergency.	Improbable	Hazardous	Tolerable	Ensure that all staff, including service providers, have health insurance	Improbable	Major	Acceptable	Y	N/A	N/A	responsible administrator statement	#623
ORG-06-03	24/04/2019	Catering - Crew Meals	Lack of crew melas may lead the crew members to higher stress and fatigue level.	Improbable	Hazardous	Tolerable	Ensure that meals for crews are available and adequate	Remote	Minor	Acceptable	In Analysis				#365
ORG-06-04	24/04/2019	Hotel - Crew	Hotel does not comply with the security or rest conditions. May lead to crew higher levels of fatigue and stress.	Occasional	Major	Unacceptable	Ensure adequate hotel conditions at the time of contract negotiation	Ocassional	Minor	Tolerable	In Analysis				#322 #381 #434 #530 #659 #834 #1043

07 - Processes

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Reports ID
ORG-07-01	26/04/2019	ACC 3 Validation	ACC 3 validation expired/not existent. Bring cargo from foreing countries	Improbable	Hazardous	Tolerable	Inform all personnel about the prohibition of bring any kind of cargo (mail included) from foreing countries without these expecific autorization.	Remote	Minor	Acceptable	Y	Y	Email 27/09/2018	N/A	#639

01 - Medical/Health

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
HF-01-01	26/04/2019	Sensory illusions	Flight after a Full Flight Simulator session leading to sensory illusions	Remote	Hazardous	Unacceptable	Control the minimum time for which flying is prohibited after an FFS session	Improbable	Hazardous	Tolerable	Y	Y	OM D - 2.1.2 (Z)	1st line observation flight	N/A
HF-01-02	26/04/2019	Personal problems of crew members	Loss of the mental resources required for safe operation of flights	Remote	Major	Tolerable	Awareness for detecting and taking into account this type of problem, support to staff who are victims of this phenomenon	Remote	Minor	Acceptable	Y	Y	SMM - 4	CRM Training	N/A
HF-01-03	26/04/2019	Self-medication - Crew member, maintenance staff	Alteration of the mental state prejudicial to the safe completion of flights	Remote	Major	Tolerable	Establish procedures in this domain, reminding of the dangers relating to self-medication and the fact that it is prohibited to fly in such cases. Consultation with the medical department for medical care	Remote	Minor	Acceptable	Y	Y	OM A - 6.1.2	N/A	N/A
HF-01-04	26/04/2019	Drugs, alcohol - crew member, maintenance staff…	Alteration of the mental state prejudicial to the safe completion of flights	Remote	Hazardous	Unacceptable	Blood-alcohol level 0.2 for flying, drug use prohibited in all cases	Ext Improbable	Hazardous	Acceptable	Y	Y	OM A - 6.1	N/A	N/A
HF-01-05	26/04/2019	Hypoxia	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Establish first aid training that includes altitude physiology and hypoxia	Improbable	Major	Acceptable	Y	Y	OM A - 5.4	N/A	N/A
HF-01-06	26/04/2019	Hypothermia	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Provide cold weather clothing and flight equipment to the crews.	Improbable	Major	Acceptable	Y	Y	ISM	N/A	N/A
HF-01-07	26/04/2019	Heatstroke	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Establish temperature and hygrometry criteria for completing flights	Improbable	Major	Acceptable	Y	Y	FCOM 2.31	N/A	N/A
HF-01-08	26/04/2019	Dehydration	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Establish temperature and hygrometry criteria for completing flights	Improbable	Major	Acceptable	Y	Y	FCOM 2.31	N/A	N/A
HF-01-09	26/04/2019	Food poisoning	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	In situ, respect the basic rules of caution and hygiene with regard to food in exotic countries. Do not eat the same meal as the other flight crew member.	Improbable	Major	Acceptable	Y	Y	OM A - 6.1	N/A	N/A
HF-01-10	26/04/2019	Other illnesses..	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Keep vaccinations up-to-date. Do not go on flight if symptoms of illness appear (fever, sweating, shivering, etc.). Contact a doctor as soon as possible.	Improbable	Major	Acceptable	Y	Y	OM A - 6.1	N/A	N/A
HF-01-11	26/04/2019	Injuries due to collision, impact, burns, etc.	Alteration of the physical and mental state prejudicial to the health of the individual	Remote	Major	Tolerable	Respect for the rules on safety and use of the workstation defined in the HSE documentation	Remote	Minor	Acceptable	Y	Y	OM A -5.4	N/A	N/A
HF-01-12	26/04/2019	Barotrauma	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the safe completion of flights	Remote	Major	Tolerable	Establish first aid training that includes Rapid Decompression	Remote	Minor	Acceptable	Y	Y	OM D	First Aid Training	N/A
HF-01-13	26/04/2019	Injuries due to operation (members trapped/broken, cuts, burns)	Alteration of the physical and mental state, possibly to the extent of loss of knowledge prejudicial to the quality of maitenance works	Remote	Major	Tolerable	Establish basic first aid training	Remote	Major	Tolerable	In the analysis the elaboration of a safety alert				#151 #168 #251 #478 #623 #847
HF-01-15	26/04/2019	Medical emergency on board	Lack of knowledge how to operate the medical equipment on board.	Remote	Major	Tolerable	Review the first aid training	Remote	Minor	Acceptable	In analysis				#114 #165 #243 #514 #811 #821 #955

02 - Fatigue

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
HF-02-01	26/04/2019	Pilot - day activity	The high number of flight slots during the day affects the pilot's level of vigilance and alters the safe execution of the flight	Remote	Major	Tolerable	Determination of the extent of the work and flying time for the Pilot, with associated rest period. Provide rest areas.	Improbable	Major	Acceptable	Y	Y	OM A - 7	AIMS/FAID	N/A
HF-02-02	26/04/2019	Pilot - night flights	Vigilance in night flights or in a simulator is altered by unsuitable rest periods before and after the flight	Remote	Hazardous	Unacceptable	Determination of the extent of the work and flying time for the pilot, with associated rest period	Improbable	Hazardous	Tolerable	Y	Y	OM Part A - 7	AIMS/FAID	N/A
HF-02-03	26/04/2019	Pilot - night flights	Fatigue and hypovigilance caused by late flights or simulator slots may be the cause of car accidents on the journey home or to their accommodation (along with the time difference).	Remote	Hazardous	Unacceptable	Determination of the extent of the work and flying time for the pilot, with associated rest period	Improbable	Negligible	Acceptable	Y	Y	OM Part A - 7	AIMS/FAID	N/A
HF-02-04	26/04/2019	Pilot - time difference	Vigilance during flights is altered by the time difference and the absence of sufficient time to acclimatise before the start of the flights	Remote	Major	Tolerable	Determination of the extent of the work and flying time for the pilot, with associated rest period	Improbable	Major	Acceptable	Y	Y	OM A - 7	AIMS/FAID	N/A
HF-02-05	26/04/2019	Maintenance and runway technician - day activity	The high number of slots during the day affects the level of vigilance of the technicians and alters their ability to conduct their task in safe conditions	Remote	Major	Tolerable	Determination of the extent of the work with associated rest period	Improbable	Major	Acceptable	Y	Y	MOM ; NF 05-03	JUPITER/AIMS	N/A
HF-02-06	26/04/2019	Maintenance and ramp technician - night flights	Fatigue and hypovigilance caused by late or nocturnal activity may be the cause of car accidents on the journey home or to their accommodation (along with the time difference).	Remote	Hazardous	Unacceptable	Determination of the extent of the work with associated rest period	Improbable	Negligible	Acceptable	Y	Y	MOM ; NF 05-03 ; JUPITER/AIMS	N/A	N/A
HF-02-07	26/04/2019	Maintenance technician - time difference	Vigilance is altered by the time difference and the absence of sufficient time to acclimatise before the start of the activity	Remote	Major	Tolerable	Determination of the extent of the work and flying time, with associated rest period	Improbable	Major	Acceptable	Y	Y	JUPITER/AIMS	N/A	N/A
HF-02-08	22/05/2017	Ramp technician - time difference	Vigilance and concentration are altered by the time difference and the absence of sufficient time to acclimatise before the start of the activity	Remote	Major	Tolerable	Determination of the extent of the work and flying time, with associated rest period	Improbable	Major	Acceptable	In analysis				N/A
HF-02-09	26/04/2019	Accumulation of fatigue	The total of the number of flights, their extent and the number of working days causes the accumulation of fatigue which may harm the health of the individual	Remote	Major	Tolerable	Determination of the number of days worked with maximum daily, weekly and monthly working periods	Improbable	Major	Acceptable	Y	Y	MOM ; NF 05-03 ; JUPITER/AIMS	N/A	#759
HF-02-10	26/04/2019	Dispatcher - day activity	The high number of flights, requests form clientes or other departments, affects the dispathcer level of vigilance and alters the safe execution of flight planning	Remote	Hazardous	Unacceptable	Determination of the extent of the work time for the dispatcher, with associated rest period and supervision. Provide rest areas, and request assistance to flight dispatch manager or his substitute.	Improbable	Hazardous	Tolerable	Y	Y	Flight dispatch SOPs	N/A	N/A
HF-02-11	26/04/2019	Dispatcher - night activity	Vigilance in night shifts is reduced, hence atention to detail is low, erros on flight planning.	Remote	Hazardous	Unacceptable	Determination of the extent of the work and time for the dispathcer, with associated rest period and supervision, Provide rest areas, and request assistance to flight dispatch manager or his substitute.	Improbable	Hazardous	Tolerable	Y	Y	Flight dispatch SOPs	N/A	#980
HF-02-12	24/04/2019	Cabin Crew - duty time exceeded	Vigilance during flights is reduced, attention to details is lower, concentration is altered.	Remote	Hazardous	Unacceptable	The conditions of rest on board aircraft should be monitored	Improbable	Hazardous	Tolerable	Y	Y	N/A	SRB	#130 #347 #524 #536 #858

03 - Stress

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
HF-03-01	26/04/2019	Stress, anxiety - Captain	Loss of the mental resources required for safe operation of flights	Remote	Major	Tolerable	Awareness for detecting and taking into account this type of problem, support to staff who are victims of this phenomenon	Improbable	Major	Acceptable	Y	Y	SMM - 4	CRM Training	N/A
HF-03-02	26/04/2019	Stress, anxiety - Copilot	Loss of the mental resources required for safe operation of flights	Remote	Major	Tolerable	Awareness for detecting and taking into account this type of problem, support to staff who are victims of this phenomenon	Improbable	Major	Acceptable	Y	Y	SMM - 4	CRM Training	N/A
HF-03-03	26/04/2019	Stress, anxiety, panic - Passenger in flight	Disruption of the flight, attention of the crew, the pilot preoccupied with a passenger distracting them from controlling the aircraft.	Remote	Major	Tolerable	Implementation of the system for detecting and taking into account this type of problem, support to staff who are victims of this phenomenon	Improbable	Major	Acceptable	Y	Y	OM D	EEP Training	N/A
HF-03-04	26/04/2019	Stress, anxiety - Dispatcher	Loss of the mental resources required for a safe operation	Remote	Major	Tolerable	Awareness for detecting and taking into account this type of problem, support to staff who are victims of this phenomenon	Improbable	Major	Acceptable	Y	Y	SMM - 4	CRM Training	N/A

04 - Pressure

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
HF-04-01	26/04/2019	Commercial, hierarchical, etc. pressure	Commercial pressure taking precedence over safety essentials	Remote	Hazardous	Unacceptable	The Accountable Manager must agree not to place economic aspects ahead of safety essentials.	Improbable	Hazardous	Tolerable	Y	Y	SMM - 0.6	Safety Police	N/A
HF-04-02	26/04/2019	Time pressure	Time pressures, urgent need to complete the mission taking precedence over safety essentials	Remote	Hazardous	Unacceptable	The Accountable Manager must agree not to place time aspects ahead of safety essentials.	Improbable	Hazardous	Tolerable	Y	Y	SMM - 0.6	Safety Police	N/A

05 - Indiscipline

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
HF-05-01	26/04/2019	Indiscipline during flight - captain	Violation, which may jeopardise the safety of the flight	Remote	Major	Tolerable	Strict respect for the OPS manual, SOPs, check-list, ATC instructions and instruction programs	Improbable	Major	Acceptable	Y	Y	OM A - 0.7	SMM 0.6 - Policy	N/A
HF-05-02	26/04/2019	Indiscipline during flight - copilot	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	Strict respect for the OPS manual, SOPs, check-list, ATC instructions and instruction programs	Improbable	Major	Acceptable	Y	Y	OM A - 0.7	SMM 0.6 - Policy	N/A
HF-05-03	26/04/2019	Indiscipline during flight - trainee	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	Strict respect for the OPS manual, SOPs, check-list, ATC instructions and instruction programs	Improbable	Major	Acceptable	Y	Y	OM A - 0.7	SMM 0.6 - Policy	N/A
HF-05-04	26/04/2019	Indiscipline during flight - crew member	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	Strict respect for the OPS manual, SOPs, check-list, ATC instructions and instruction programs	Improbable	Major	Acceptable	Y	Y	OM A - 0.7	SMM 0.6 - Policy	N/A
HF-05-05	26/04/2019	Unacceptable behaviour of a passenger (failure to respect safety instructions)	On the ground, may disturb the crew and the other passengers. During a flight, may disturb the flight, distract the crew and put safety at risk.	Occasional	Minor	Tolerable	Before the flight, calm the passenger and explain to them that they must respect the instructions or be removed from the aircraft. During a flight, try to reason with them. If this is not possible, cut short the flight and have them removed from the aircraft	Occasional	Negligible	Acceptable	Y	Y	OM A - Chapter 10.1.6	N/A	N/A

HF-05-06	26/04/2019	Failure to respect smoking bans around aircraft safety areas	Danger of fire, explosion	Remote	Major	Tolerable	Respect for internal regulations	Improbable	negligible	Acceptable	Y	Y	Normas (ANA)	Distributed via Jupiter	N/A
HF-05-07	26/04/2019	Use of mobile phones during refuelling operations	Danger of fire, explosion	Occasional	Hazardous	Unacceptable	Respect for internal regulations	Improbable	negligible	Acceptable	Y	Y	Normas (ANA)	Distributed via Jupiter	N/A

06 - Excessice Confidence

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
HF-06-01	26/04/2019	Excessive confidence - captain	Violation which may jeopardise the safety of the flight	Remote	Major	Tolerable	HF and CRM training	Improbable	Major	Acceptable	Y	Y	OM Part D	CRM	N/A
HF-06-02	26/04/2019	Excessive confidence - copilot	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	HF and CRM training	Improbable	Major	Acceptable	Y	Y	OM Part D	CRM	N/A
HF-06-03	26/04/2019	Excessive confidence - trainee	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	HF and CRM training	Improbable	Major	Acceptable	Y	Y	OM Part D	CRM	N/A
HF-06-04	26/04/2019	Excessive confidence - crew member	Violation, failure to respect the authority of the captain, which may jeopardise the safety of the flight	Remote	Major	Tolerable	HF and CRM training	Improbable	Major	Acceptable	Y	Y	OM Part D	CRM	N/A

07 - Human Error

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
HF-07-01	26/04/2019	Errors, unsafe acts	Incidents, Tolerable incidents, accidents, etc.	Frequent	Major	Unacceptable	Implementation of a system of Feedback, information to the HF, CRM, SMS, etc.	Remote	Major	Tolerable	Y	Y	SMM - 3	SMS/IQSMS	N/A
HF-07-02	24/04/2019	Slide raft	Door opened inadvertly with the slide raft armed.	Remote	Major	Tolerable	Creation the new Disarming/Opening the Doors - Procedure	Remote	Major	Tolerable	Y	Y	OM B - CM	BC-SAF-022	#188 #368 #396
HF-07-03	26/04/2019	Component Incorrect Installation	Component malfunction or even failure.			Acceptable	Ensure extra monitoring in cases of large and / or extensive repairs	Improbable	Major	Acceptable	Y	Y	TASK FORCE 18/03/2019		#395 #991 #1031

08 - Comunication

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
HF-08-01	26/04/2019	No synergy or poor synergy of the crew	Crew members not trained in crew work techniques	Remote	Major	Tolerable	Training of the crew members in CRM	Improbable	Major	Acceptable	Y	Y	OM D - CRM training	CRM	N/A
HF-08-02	26/04/2019	Strained relations between members of the team or the crew	Alteration in communication prejudicial to flight safety	Remote	Major	Tolerable	Chief pilot may decide to change crew composition.	Improbable	Major	Acceptable	Y	N	N/A	Chief Pilot - PN TEAM Manager - DME	N/A

01 - Meteorology

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
ENV-01-01	26/04/2019	Flight conditions (VMC, IMC)	May lead to an inadvertent entry to IMC	Remote	Catastrophic	Unacceptable	Determination of an emergency procedure to define conduct when faced with this kind of event. During simulator training, carry out an exercise on the subject. Establish minimum weather conditions for making flights depending on their nature.	Improbable	Catastrophic	Tolerable	Y	Y	OM Part D	Simulator	#105 #108 #872
ENV-01-02	26/04/2019	Icy conditions	May lead to a rapid degradation of flight performances and a catastrophic situation.	Remote	Catastrophic	Unacceptable	Annual reminder of flying in icy conditions and how to avoid icy conditions for aircraft which have not been de-iced (OPS manual). Schedule: pre-flight visit, use of de-icing and anti-icing systems, icing and associated dangers, operations at temperatures below 10 degrees and in snowy conditions, etc.) Flights in icy conditions will only take place with aiplanes equipped and certified for the flight in icy conditions (OPS manual). The flying time in these conditions will be restricted to a minimum.	Improbable	Catastrophic	Tolerable	Y	Y	OM A - 8.2	N/A	#529
ENV-01-03	26/04/2019	Heavy rain, hail	May lead to engine flameout or structural damage to the aircraft	Remote	Catastrophic	Unacceptable	Before the flight, study the weather forecast in particular. In flight and in IMC, avoid suspect cloud formations.	Improbable	Catastrophic	Tolerable	Y	Y	OM A - 8.1	N/A	#763
ENV-01-04	26/04/2019	Strong winds, turbulence, windshear	May lead to structural damage to the aircraft by load factor, may also lead to a loss of control during flight	Remote	Catastrophic	Unacceptable	Establish minimum criteria for making flights. Before the flight, study the weather forecast in particular. Do not hesitate to cancel or delay the flight if necessary. Parking of aircraft: carry the fly-away kit (lashings, blade slings, shutters, etc.)	Improbable	Catastrophic	Tolerable	Y	Y	OM A - 8.1	N/A	#157 #173 #201 #203 #207 #225 #247 #268 #284 #373 #379 #380 #404 #628
ENV-01-05	26/04/2019	Snow	May lead to a rapid degradation of horizontal visibility, flight performances (icing) and a catastrophic situation (loss of control, inadvertent entry to IMC, etc.)	Remote	Catastrophic	Unacceptable	On an equipped aircraft, provide a reminder during the pre-flight briefing on how to use the anti-icing system. Provide a reminder during the crew safety briefings on the dangers linked to this type of flight. Establish minimum criteria for making flights. Parking of aircraft: carry the fly-away kit (lashings, blade slings, shutters, etc.)	Improbable	Catastrophic	Tolerable	Y	Y	OM A - 8.1 ISM	N/A	#110
ENV-01-06	26/04/2019	Outside temperatures (hot, cold)	Leads to limitations in the implementation and operation of the aircraft. Leads to a drop in the physical and intellectual performances of the crew without suitable protective clothing.	Remote	Major	Tolerable	Compulsory determination of flight performances. For preparation crews and staff, equip with suitable protective gear (cold weather). In hot weather, only operate under certain outdoor temperatures compatible with the scope of the work.	Remote	Minor	Acceptable	Y	Y	ISM	N/A	N/A
ENV-01-07	26/04/2019	Humidity	Leads to a drop in the physical and intellectual performances of the crew without suitable recovery measure.	Remote	Major	Tolerable	Awareness fot this kind of situation and make recommendations for dealing with this type of condition	Remote	Minor	Acceptable	Y	Y	OM A - 6.1	N/A	N/A
ENV-01-08	26/04/2019	White out/White snow during take-off and landing	May lead to a loss of visual reference and therefore a loss of control of the aircraft	Remote	Hazardous	Unacceptable	Pay close attention when flying over snow or sandy environments. Deal with this point during the pre-flight briefing. Describe the procedure to be applied if this phenomenon occurs (announcements, task distribution, etc.)	Improbable	Major	Acceptable	Y	Y	SOPS - 1	N/A	N/A
ENV-01-09	24/04/2019	Lightning / Thunderstorm	May lead to aircarft damage or lost of control.	Improbable	Hazardous	Tolerable	Establish a good go around procedure	Improbable	Minor	Acceptable	Y	Y	SOPS - 6.7	N/A	#119 #163 #195 #331 #385 #707 #715 #942 #1005 #1056

02 - Atmosphere

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
ENV-02-01	26/04/2019	Saline atmosphere	Leads to corrosion on the aircraft and the equipment	Remote	Major	Tolerable	Ensure that the aircraft is properly rinsed each evening after the last flight.	Remote	Minor	Acceptable	Y	Y	T-Transit	N/A	N/A
ENV-02-02	26/04/2019	Sandy atmosphere	Leads to damage to engine performance without suitable protection, leads to damage to the aircraft due to the effects of abrasion	Remote	Major	Tolerable	Position the anti-sand protection when the aircraft is at the parking point. Check that maintenance carries out the engine control operations.	Remote	Minor	Acceptable	Y	Y	OM A - 8.3.8.9	N/A	N/A

ENV-02-03	26/04/2019	Volcanic dust	Leads to considerable degradation on the engines	Remote	Hazardous	Unacceptable	Apply the most recent recommendations plus aircraft engine manufacturer documentation.	Improbable	Hazardous	Tolerable	Y	Y	OM A - 8.3.8.7	N/A	#961
ENV-02-04	26/04/2019	Density altitude	Too high, deterioration of performances. Too Remote, mechanical constraints.	Remote	Major	Tolerable	Compulsory determination of flight performances.	Improbable	Major	Acceptable	Y	Y	Flygprestanda	N/A	N/A

03 - Terrain

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
ENV-03-01	26/04/2019	Overwater flight	Forced water landing, panic when evacuating the aircraft, survivability in maritime environment	Improbable	Catastrophic	Tolerable	Carrying and wearing if necessary rescue equipment (life rafts, life vests, waterproof flight suits, etc.) Pre-flight safety briefing compulsory if transporting passengers	Improbable	Major	Acceptable	Y	Y	OM B - 3.13	N/A	N/A
ENV-03-02	26/04/2019	Flying over inhospitable regions (desert, polar, mountain, rainforest, etc.)	Forced landing, panic when evacuating the aircraft, survivability in hostile environment	Improbable	Catastrophic	Tolerable	Carrying and wearing if necessary rescue equipment adapted to the inhospitable region over which you are flying. Pre-flight safety briefing compulsory if transporting passengers. Plan escape routes with as many collection areas as possible. Fly at highest altitude possible over remote areas to have more time to apply the emergency procedures, pass on the distress message and choose a landing zone	Improbable	Major	Acceptable	Y	Y	OM PART C	N/A	N/A
ENV-03-03	26/04/2019	Flying over urban or peri-urban areas	Little or no possibility of emergency landing in the event of engine failure.	Remote	Catastrophic	Unacceptable	Respect the regulations in force. Use the engine out procedures if published or brief one if not published.	Improbable	Catastrophic	Tolerable	Y	Y	Airport Charts	N/A	N/A

04 - Airport

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
ENV-04-01	26/04/2019	Bird strike	Collision in flight likely to cause structural damage, piping failures, engine shutdown, injuries to persons occupying the aircraft	Remote	Hazardous	Unacceptable	Bird strike hazard control policy of the parking base (rockets, bird scarers, hunting, etc.). Switch on the lights and RADAR during take-off and landing.	improbabl	Hazardous	Tolerable	Y	Y	OM A - 8.3 OM C - Airport Brief	N/A	#112 #133 #135 #136 #138 #175 #196 #230 #240 #324 #435 #438
ENV-04-02	26/04/2019	Foreign Object Damage	May lead to a loss of engine in flight, deterioration of Hazardous assemblies	Remote	Hazardous	Unacceptable	Ensure that the body has an FOD prevention program. If the company has a Part 145 approval, this should guarantee this standard. Before the flights, ensure that the start-up area is clean and clear. Pay particular attention to the pre-flight inspection.	Improbable	negligible	Acceptable	Y	Y	Certificado Part -145	EAA is approval Part-145	N/A
ENV-04-03	26/04/2019	Runway conditions	Existence of holes, objectes, animals or people in the Runway	Improbable	Major	Acceptable	Carry out airport risk analysis with the necessary mitigation measurables	Improbable	Minor	Acceptable	Y	Y	OM C - Airport Brief	N/A	#367 #973
ENV-04-04	26/04/2019	No parking marks	May lead to a colision with another aircraft, building or vehicle. May lead to structural damage.	Improbable	Major	Acceptable	Carry out airport risk analysis with the necessary mitigation measurables	Improbable	Minor	Acceptable	Y	Y	OM C - Airport Brief	N/A	#387

05 - Work Time

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
ENV-05-01	26/04/2019	Flying period (dawn, morning, afternoon, dusk, night)	The combination of a reduction in visibility and a reduction in the level of vigilance may be prejudicial to flight safety	Remote	Major	Tolerable	Sufficient rest period before start of flight. In the pre-flight briefing, provide a reminder of the dangers linked to this type of flight (change of brightness, remote sun, rapidly decreasing horizontal visibility, etc.)	Improbable	Major	Acceptable	Y	Y	OM A - 7	N/A	N/A

06 - Work Space

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
ENV-06-01	26/04/2019	Maintenance premises unsuitable (insufficient lighting, heating, protection against weather conditions, no soundproofing)	May be a contributing factor to a maintenance error	Remote	Hazardous	Unacceptable	Ensure that the safety of the premises is of an acceptable standard. If the company has a Part 145 approval, this should guarantee this standard.	Improbable	negligible	Acceptable	Y	Y	MOM 1.8	EAA is approval Part-145	N/A
ENV-06-02	26/04/2019	Absence of a dedicated parking zone, on start-up of aircraft	Reduction in the safety spacing between aircraft on start-up, on taxiing, in relation to obstacles, etc.	Remote	Major	Tolerable	Before start-up, ensure the minimum space between aircraft, and between the aircraft and any obstacles. Do not hesitate to move the aircraft if necessary.	Improbable	Major	Acceptable	Check the need to carry out a risk assessment				N/A
ENV-06-03	26/04/2019	Absence or lack of marking, beacons on the ground (parking, taxiing, etc.) or traffic area.	Reduction in the safety spacing between aircraft on start-up, on taxiing, in relation to obstacles, etc.	Remote	Major	Tolerable	Specific vigilance during start-up and displacement phases. Mention this during the pre-flight briefing (distribution of visual surveillance)	Improbable	Major	Acceptable	Check the need to carry out a risk assessment				N/A
ENV-06-04	26/04/2019	Parking zone not protected and left open for access to all (vehicles, pedestrians, animals, etc.)	Risk of collision with vehicles, pedestrians, animals, etc.	Remote	Major	Tolerable	Specific vigilance during start-up and displacement phases. Mention this during the pre-flight briefing (distribution of visual surveillance)	Improbable	Major	Acceptable	Check the need to carry out a risk assessment				N/A
ENV-06-05	16/05/2017	In hangar, no ground marking showing the aircraft parking and mechanical assembly positions	Risk of tripping or bumping into things when moving around	Remote	Major	Tolerable	Ensure that this type of marking and beacons exists. If not, arrange a location and a route with the platform manager.	Improbable	negligible	Acceptable	In analysis				N/A
ENV-06-06	16/05/2017	Workshop untidy	Risk of tripping or bumping into things when moving around	Remote	Major	Tolerable	The hangar manager must constantly ensure the correct storage of the models and benches. Staff must be made aware of the problem	Improbable	Major	Acceptable	In analysis				N/A
ENV-06-07	16/05/2017	Fall of heavy object (mechanical assembly element)	Injury, fatality caused by crushing	Remote	Hazardous	Unacceptable	The heavy mechanical assembly elements are fixed on specific ad-hoc supports. The staff must wear safety boots.	Improbable	minor	Acceptable	In analysis				N/A
ENV-06-09	26/04/2019	Unlocked Gate / Door / Windows	Security consern	Improbable	Major	Acceptable	Conduct rounds on buildings, as well as sensitize employees to security issues	Improbable	minor	Acceptable	Y	Y	Progama de formação de Segurança	PSG	#573 #978
ENV-06-10	26/04/2019	Paviment Conditions - Holes, water	Emploeeys may suffer injuries. Equipment damage.	Improbable	Major	Acceptable	Conduct rounds on buildings	Improbable	minor	Acceptable	Y	Y	Relatorio diario da PSG		#426 #705

01 - Material

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
TEC-01-01	16/05/2017	Use of non-compliant parts (forgeries, repairs not inspected by a quality department, etc.)	May lead to a failure of a system during flight, or even a mechanical disruption which may lead to an emergency or distress situation (loss of control during flight)	Improbable	Catastrophic	Unacceptable	Ensure that the body has a service for the management of parts, systems and assemblies. In general, ensure that parts which are not airworthy are identified as such and stored in a secure room to ensure they are not used. If the company has a Part 145 approval, this guarantees this standard.	Improbable	negligible	Acceptable	Y	Y	Certificado Part -145	EAA is approval Part-145	N/A
TEC-01-02	16/05/2017	Lifting apparatus poorly maintained or not maintained (workshop crane, overhead crane, jacks, slings, pedals)	May lead to a load falling on staff. Injury or fatality caused by crushing	Remote	Hazardous	Unacceptable	Ensure that the body has such equipment available. The Hangar manager should ensure their monitoring and maintenance. If the company has a Part 145 approval, this should guarantee this standard. Before use, ensure the good general condition of the step-ladders (chocks, protection, etc.). Use harnesses when working at heights.	Improbable	minor	Acceptable	Y	Y	Certificado Part -145	EAA is approval Part-145	N/A
TEC-01-03	16/05/2017	Lack of step-ladder or gantry	Due to unease, the staff may cause errors or infractions in the maintenance operations. The staff may also fall from the aircraft. Damage model by pressing inappropriate areas - Fault in educational demonstration.	Remote	Hazardous	Unacceptable	Ensure that the body has such equipment available. The Hangar manager should ensure their monitoring and maintenance. If the company has a Part 145 approval, this should guarantee this standard. Before use, ensure the good general condition of the step-ladders (chocks, protection, etc.). Use harnesses when working at heights.	Improbable	minor	Acceptable	Y	Y	Certificado Part -145	EAA is approval Part-145	N/A
TEC-01-04	16/05/2017	Common use of products, corrosive, toxic or flammable liquids	corrosive and allergenic hydraulics, PR resins, flammable products.	Remote	Major	Tolerable	Storage of products and ingredients in secure premises, in suitable and identified packaging. Handling of products by trained staff only and wearing PPE	Improbable	Major	Acceptable	Y	Y	MOM	N/A	N/A
TEC-01-05	22/05/2017	Lack of ingredients (oil, hydraulics, etc.)	The failure to supplement the systems concerned may lead to a potentially hazardous situation in flight through a system, engine or component failure	Remote	Hazardous	Unacceptable	Ensure that the aircraft has such ingredients available. If the company has a Part 145 approval, this should guarantee this standard.	Improbable	negligible	Acceptable	Y	Y	Certificado Part -145	EAA is approval Part-145	N/A
TEC-01-06	30/04/2019	Products with expired date	Corrosive and allergenic hydraulics, PR resins, flammable products.	Improbable	Hazardous	Acceptable	Improvement of processes OUT OF SERVICE COMPONENTS	Extremely Improbable	Hazardous	Acceptable	Y	Y	NF-07-15	N/A	#453

02 - Fuel

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
TEC-02-01	16/05/2017	Fuel not adapted to this type of engine or use (anti-icing, etc.)	Loss of engine power in flight	Improbable	Hazardous	Tolerable	Ensure during flight preparation that on the ground at the destination or the stopover, there is a fuel delivery service providing suitable fuel	Improbable	Nil	Acceptable	Y	Y	Pre- Flight Dispatch checklist	N/A	N/A
TEC-02-02	22/05/2017	Polluted fuel	Loss of engine power in flight	Improbable	Hazardous	Tolerable	Ensure during flights that the fuel has been tested before filling up.	Extr. Improbable	Hazardous	Acceptable	Crews was briefed that in case of suspicion should request fuel test.				#891
TEC-02-03	16/05/2017	Error in the quantity of fuel taken on	Loss of engine power in flight. Error in the calculation of the minimum fuel quantity or error in the quantity provided by the delivery organisation.	Improbable	Hazardous	Tolerable	Counter-check the calculation of the minimum fuel quantity and counter-check the quantity of fuel taken on.	Extr. Improbable	Hazardous	Acceptable	Y	Y	SOPS 5	N/A	#663
TEC-02-04	16/05/2017	Fuel spillage	Pollution, risk of fire during the start-up	Remote	Major	Tolerable	Ensure that the parking platform has a service for cleaning and recovery of polluting fluids; Move the aircraft before the start-up.	Improbable	Major	Acceptable	In analysis				#220 #262 #415 #511 #634 #1007
TEC-02-05	26/04/2019	Fuel Imbalance	Loss of aircraft control. Structural damage.	Improbable	Hazardous	Tolerable	Monitor this type of event in the area of reliability	Improbable	Major	Acceptable	Reability programme and meetings				#946 #1032

03 - Systems

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
TEC-03-01	16/05/2017	Pressurised Hydraulic Circuit	Injury by pressurised hydraulic projection	Remote	Major	Tolerable	The hydraulic systems of the benches should be equipped with safety systems compliant with the standards. The hydraulic generation benches should be checked periodically	Improbable	Major	Acceptable	Y	Y	Programa de Manutenção	N/A	#103
TEC-03-02	16/05/2017	Electrical circuits of the models and benches	Electrocution	Remote	Major	Tolerable	The electrical systems of the models and benches should be equipped with protection and safety systems compliant with the standards.	Improbable	Major	Acceptable	In analysis				N/A
TEC-03-03	16/05/2017	Stove ovens, hydraulic presses, machine tools from mechanical and composite workshops	Injuries by burning, crushing, cutting.	Remote	Major	Tolerable	The use of this equipment is restricted to qualified staff. For training, it should always be carried out under the supervision of the instructor	Improbable	Major	Acceptable	In analysis				N/A
TEC-03-04	16/05/2017	Transponder failure	No detection by secondary radar, no longer guarantee that minimum spacing between aircraft is respected, especially in congested area. Risk of mid-air collision.	Remote	Hazardous	Unacceptable	Apply the procedure set out in the national regulations of the country over which you are flying. Provide a reminder of the required conduct in the OPS manual. Depending on the type of flight, insist on this point during the pre-flight briefing.	Improbable	Negligible	Acceptable	Y	Y	MEL of each fleet	N/A	N/A
TEC-03-05	26/04/2019	Interphone malfunction	Cabin crew unable to communicate with the cockpit	Occasional	Major	Unacceptable	Apply the crew supplementary procedures in case of these malfunction	Occasional	Minor	Acceptable	Y	Y	CM - 2.1.3	N/A	#169 #170 #229 #306 #345 #810
TEC-03-06	26/04/2019	Presurization System Failure	Pax and crew illness. Structural problems.	Remote	Hazardous	Tolerable	Monitor this type of event in the area of reliability	Improbable	Hazardous	Tolerable	Reability programme and meetings				#264 #718 #785 #972 #1026
TEC-03-07	30/04/2019	TCAS Failure / Error	Midair collision	Remote	Hazardous	Tolerable	Monitor this type of event in the area of reliability	Improbable	Hazardous	Tolerable	Reability programme and meetings				#101 #294 #330 #343 #539
TEC-03-08	30/04/0219	Oxygen Masks	Cabin panic if mask are droped accidently.	Improbable	Hazardous	Tolerable	Monitor this type of event in the area of reliability	Improbable	Hazardous	Tolerable	Reability programme and meetings				#132
TEC-03-09	30/04/2019	Altimeter Inoperative	CFIT	Improbable	Hazardous	Tolerable	Monitor this type of event in the area of reliability	Improbable	Hazardous	Tolerable	Reability programme and meetings				#215

04 - Engine, APU

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
TEC-04-01	26/04/2019	Blade Damage	Component structural damage. Explosion.	Remote	Major	Tolerable	Ensure that tracks and taxiaways are in good condition	Improbable	Major	Acceptable	Letters was sent to ALetters was sent to Authorities of the airports involved for corrective actions				#307 #464 #694
TEC-04-02	26/04/2019	Vibration Exceedence	Component structural damage, failure.	Remote	Major	Tolerable	Monitor this type of event in the area of reliability	Improbable	Major	Acceptable	Reability programme and meetings				#362 #363 #898 #932

05 - Structure

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
TEC-05-01	26/04/2019	Window cracked	Flight crew injury. Despressurization of the cabin or cockpit.	Improbable	Hazardous	Tolerable	Ensure control of suppliers and defective material	Improbable	Hazardous	Acceptable	Y	Y	NF-07-01	N/A	#128 #465 #720
TEC-05-02	26/04/2019	Cabin structural damage	Pax or cabin crew injury during flight	Improbable	Hazardous	Tolerable	Ensure control of suppliers and defective material	Improbable	Hazardous	Acceptable	Y	Y	NF-07-01	N/A	#486 #509
TEC-05-03	26/04/2019	MMO exceedence	Structural damage	Remote	Major	Tolerable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Improbable	Major	Acceptable	Y	Y	OM -D SIMULATOR PROFILE FDMM	N/A	#258 #491 #567 # 651 #711 #895 #905 #964 #1000
TEC-05-04	30/04/2019	Potencial Exceeded	May lead to a catastrophic failure of the component	Improbable	Major	Tolerable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Extremly Improbable	Major	Acceptable	Y	Y	OM -D SIMULATOR PROFILE FDMM	N/A	#150

06 - Landing Gear, Brakes and Wheels

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
TEC-06-01	26/04/2019	Hard Landing	Landing Gear Collapse	Occasional	Major	Unacceptable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Remote	Major	Tolerable	Y	Y	OM -D SIMULATOR PROFILE FDMM	N/A	#190 #204 #214 #276 #288 #311 #364 #450 #460 #474
TEC-06-02	26/04/2019	Configuration Warnings	In case the landing gear is not setup and the warning does not sound, an accident can occur	Improbable	Hazardous	Tolerable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Improbable	Hazardous	Acceptable	Y	Y	OM -D SIMULATOR PROFILE FDMM	N/A	#115 #121 #154 #166 #172 #244 #293 #369 #761 #776
TEC-06-03	26/04/2019	Wheels - low pressure, delaminated, cut	Landing gear damage. RWY or TWY excursion.	Remote	Major	Tolerable	Ensure control of suppliers and defective material	Improbable	Hazardous	Acceptable	Y	Y	NF-07-01	N/A	#375 #716 #773 #783 #1016
TEC-06-04	26/04/2019	Overheat - Brakes	Fire	Remote	Major	Tolerable	Updated T1 Inspections and checking the size of the wear indicator pin	Improbable	Major	Acceptable	Y	Y	T1 - Mod. ME	N/A	#216 #254 #417 #468 #483 #695 #782

07 - Aerodynamic Surfaces

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
TEC-07-01	26/04/2019	Slats	Structural damage. Component failure.	Remote	Hazardous	Unacceptable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Improbable	Hazardous	Tolerable	Y	Y	OM -D SIMULATOR PROFILE FDMM	N/A	#126 #412 #419 #737 #787
TEC-07-02	26/04/2019	Flaps	Structural damage. Component failure.	Occasional	Major	Unacceptable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Remote	Major	Tolerable	Y	Y	OM -D SIMULATOR PROFILE FDMM	N/A	#227 #255 #304#337 #349 #394 #436 #473 #489 #498
TEC-07-03	26/04/2019	Speed Brake / Spoilers	Structural damage. Component failure.	Improbable	Hazardous	Acceptable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Improbable	Hazardous	Acceptable	Y	Y	OM -D SIMULATOR PROFILE FDMM	N/A	#104 #282 #493

08 - Fuilds

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
TEC-08-01	16/05/2017	Hot Surfaces/Fluides	Hot refreshments, exhaust nozzles, jet pipes, hot components, heated sensors, screens and brakes	Remote	Hazardous	Unacceptable	Respect for internal regulations and specific HSE instructions.	Improbable	negligible	Acceptable	In the analysis the elaboration of a safety alert				N/A
TEC-08-02	26/04/2019	Hydraulic Leak	Burns. Component failure.	Remote	Hazardous	Tolerable	Performed the T and T1 inspection	Remote	Major	Tolerable	Y	Y	MOM 2.16.1	N/A	#156 #376 #490 #709 #771

B767 Fleet

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
TEC-B76-01	25/05/2017	Repetitive instances of B767 operators nose wheel installation without the axle washer	Failure to follow the AMM Task, together with the fact that the upon wheel removal the washer might stay with the wheel (not visible due to the grease)	Remote	Major	Tolerable	Issue an alert, in order to avoid the recurrence of this error.	Improbable	Major	Acceptable	Y	Y	InfoQual nbr 13-17	N/A	N/A

B737 Fleet

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
TEC-B73-01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B777 Fleet

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
TEC-B77-01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

01 - Documentation, Information and Forms

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
OP-01-01	29/04/2019	Information on the route - Inexitent, Incomplete, Erroneous	Delay in completing flights due to lack of information. During flight, safety potentially undermined due to lack of information (near miss, no-flyover zone, disturbances)	Remote	Major	Tolerable	Carry out airport risk analysis with the necessary mitigation measurables	Improbable	Major	Acceptable	Y	Y	OM C - Airport Brief	N/A	#106 #109 #140 #184 #199 #233 #246 #253 #267 #273 #286 #292 #335 #338 #397 #411 #420 #424 #501 #571 #622
OP-01-02	29/04/2019	Information about main base - Inexitent, Incomplete, Erroneous	Delay in completing flights due to lack of information. During flight, safety potentially undermined due to lack of information (mid-air collision, no-flyover zone, disturbances)	Remote	Major	Tolerable	Carry out airport risk analysis with the necessary mitigation measurables	Improbable	Major	Acceptable	Y	Y	OM C - Airport Brief	N/A	
OP-01-03	29/04/2019	Lack of aeronautical documentation or incomplete documentation	Delay in the preparation and execution of the flight. Possible penalties, flight safety potentially undermined	Remote	Major	Tolerable	When preparing flights, anticipate aeronautical documentation orders	Improbable	Major	Acceptable	Y	Y	SOPS Dispatch - 2	N/A	#568
OP-01-04	29/04/2019	No means of filing flight plan	No possibility of informing the air traffic services on the planning for a flight.	Remote	Major	Tolerable	Ensure that there are resources in place to file a flight plan. Ensure that this type of resource exists to allow a flight plan to be filed (printed) on the destination and alternate aerodromes.	Improbable	Negligible	Acceptable	Y	Y	SOPS Dispatch - 3	N/A	N/A
OP-01-05	29/04/2019	No means for activating flight plan	No possibility of informing the air traffic control service of an aircraft movement. No possibility of receiving information and alert services.	Remote	Hazardous	Unacceptable	Ensure that there are resources in place to file a flight plan. Ensure that this type of resource exists to allow a flight plan to be filed (printed) on the destination and alternate aerodromes.	Improbable	Negligible	Acceptable	Y	Y	SOPS Dispatch - 3	N/A	N/A
OP-01-06	29/04/2019	No closure of flight plan	Possibility of triggering search actions from the alert service.	Remote	Major	Tolerable	Ensure that there are resources in place to file a flight plan. Ensure that this type of resource exists to allow a flight plan to be filed (printed) on the destination and alternate aerodromes.	Improbable	Negligible	Acceptable	Y	Y	SOPS Dispatch - 3	N/A	N/A
OP-01-07	29/04/2019	1st flight in situ.	Mission insufficiently prepared leading to gaps and breaches which may affect flight safety	Remote	Hazardous	Unacceptable	Search for all the information available.	Improbable	Negligible	Acceptable	Y	Y	Pre-Dispatch checlist; OM Part C	N/A	N/A
OP-01-08	26/05/2017	No clear information regarding operation, ambiguos information, no information regarding aircraft or crew status	Dificulty on understanding Client/Providers, ie low english level, dificult accent	Frequent	Major	Unacceptable	Extablish comunication with key persons on operations, test contacts before operations. Brief staff in to communicating with simple terms and logics.	Improbable	Major	Acceptable	Y	N	N/A	Daily shift reports, Mission brifing updates	N/A
OP-01-09	29/04/2019	No flight manual on board the aircraft, flight manual not up-to-date	Inaccuracy with regard to the determination of the flight performances, normal and emergency procedures to be applied may lead to a potentially hazardous situation	Remote	Hazardous	Unacceptable	Check that an easily accessible and up-to-date flight manual is present on board the aircraft	Improbable	negligible	Acceptable	Y	Y	OM A - 8.1.12	N/A	N/A
OP-01-10	29/04/2019	Work documentation not up-to-date	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	ensure that the maintenance staff use up-to-date work documentation. If the company has a Part 145 approval, this should guarantee this standard.	Improbable	Major	Acceptable	Y	Y	Certificado Part -145	EAA is approval Part-145	N/A
OP-01-11	29/04/2019	Delay in the application of the OEM recommendations	A delay in the application of recommendations or instructions from the OEM can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	Ensure that the maintenance staff apply the recommendations of the OEMs. If the company has a Part 145 approval, this should guarantee this standard.	Improbable	Major	Acceptable	Y	Y	Certificado Part -145	EAA is approval Part-145	N/A
OP-01-12	29/04/2019	Technical log book incorrectly completed, incomplete	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	Ensure before the start of the flights that the aircraft log book is correctly completed and counter-signed by the person responsible for the take-off.	Improbable	Major	Acceptable	Y	Y	SOPS - 5	N/A	N/A
OP-01-13	29/04/2019	Airworthiness certificate or equivalent not up-to-date or missing	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)	Remote	Catastrophic	Unacceptable	Ensure that the aircraft has an up-to-date airworthiness certificate (CDN) (or equivalent)	Improbable	negligible	Acceptable	In analysis				N/A

OP-01-14	29/04/2019	MEL incomplete or missing	Inaccuracy with regard to the choice of action in the event of the failure of a component or system may lead to a potentially hazardous situation	Remote	Hazardous	Unacceptable	Ensure that the aircraft has an up-to-date MEL.	Improbable	negligible	Acceptable	Y	Y	OM A - 8.1.12	N/A	N/A
OP-01-15	29/04/2019	Anomalies in the manufacturer's documentation	Risk of a maintenance error, of use which may lead to a degradation of the situation.	Occasional	Hazardous	Unacceptable	Definition of an internal procedure to firstly put in place local protective measures (staff information, safety alert, etc.) and secondly to send the information to the manufacturer	Remote	Hazardous	Tolerable	Y	Y	MOM - 2.27	N/A	N/A

02 - Aerodrome Operating Conditions

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
OP-02-01	24/04/2019	No lighting system (night-time flights, IFR, etc.)	Degradation of the conditions for making flights.	Remote	Hazardous	Unacceptable	Determine the minimum weather conditions for making flights. Restriction of flight slots to daytime flights only.	Improbable	Hazardous	Tolerable	Y	Y	Airport charts and NOTAM	N/A	#780
OP-02-02	24/04/2019	No SAR organisation	No alert service in the event of an emergency or distress. Delay in rescue operations	Remote	Catastrophic	Unacceptable	Ensure that an SAR service or equivalent exists in the country concerned. Filing of a flight plan or systematic equivalent for completing flights.	Improbable	Major	Acceptable	Y	Y	SOPS Dispatch - 2	N/A	N/A
OP-02-03	24/04/2019	Too long distance between the work areas or the airport platforms	Loss of time leading to fatigue	Remote	Hazardous	Unacceptable	Take this data into account when preparing the flights	Extr. Improbable	Hazardous	Acceptable	Y	Y	SOPS Dispatch - 2	N/A	N/A
OP-02-04	24/04/2019	No possibility of refuelling on destination airport	Carrying of additional fuel, possible degradation of flight performances	Frequent	Negligible	Tolerable	Take this data into account when preparing the flights	Remote	Negligible	Acceptable	Y	Y	Airport charts and NOTAM	N/A	N/A
OP-02-05	24/04/2019	Runway/Taxiway incursion	Entry into a manoeuvring area when an aircraft is taking off or landing	Remote	Catastrophic	Tolerable	Reminder in the OPS manual of the need to respect the compulsory stagnation points, the phraseology and the instructions of ground control. On outdoor platforms (national or international), pay particular attention to the radio message and to aircraft on the final leg. Systematically collate the ATC instructions and request confirmation in the event of doubt	Improbable	Catastrophic	Acceptable	Y	Y	Airport charts OM C - briefings	N/A	#171 #770 #790

03 - Cargo

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
OP-03-01	26/04/2019	Insufficient information on the nature of the load in the hold	Flammable, poorly packaged or suspicious products may be on board	Remote	Catastrophic	Unacceptable	Find out in particular, before the departure, the nature of the load, whether it is compatible with this type of flight and with passenger transport. Obtain all customs and IATA documents required (invoice, packaging status, etc.). Do not hesitate to unload the aircraft if necessary.	Improbable	Catastrophic	Tolerable	In analysis				#346 #556
OP-03-02	26/04/2019	Load Sheet errors or missing	Force of habit or lack of time may mean that the crew does not have enough time for this calculation, which may have important repercussions on the determination of flight performances and the controllability of the aircraft	Remote	Hazardous	Unacceptable	Systematically check the loads and the performances before starting the flights. Use the Load Sheet Statement made by the IO.	Improbable	Negligible	Acceptable	Y	Y	IO Checklist	N/A	#242 #256 #470 #535 #582 #633 #641 #708 #959
OP-03-03	26/04/2019	Transport of dangerous goods	Risk of fire, explosion during the loading and in flight	Improbable	Catastrophic	Tolerable	Training staff to handle this type of freight (storage, packaging, stowage standards, safety rules). Respect for IATA regulations. Depending on the nature of the freight, define parking points for the aircraft which are far from the public and infrastructures.	Improbable	Minor	Acceptable	Y	Y	Dangerous Goods Manual	N/A	#582 #947 #995
OP-03-04	26/04/2019	Damaged Container	Cargo loss. Aircraft immbalance	Remote	Major	Tolerable	Service provider monitoring	Improbable	Major	Acceptable	Y	Y	NO-DCM-007	N/A	#388 #580 #586 #619 #988

OP-03-05	26/04/2019	Lack of proper equipment to load/unload the aircraft	Employee injury. Container damage. Aircraft structural damage	Extremily Improbable	Major	Acceptable	Service provider monitoring	Extremily Improbable	Major	Acceptable	Y	Y	NO-DCM-007	N/A	#764
OP-03-06	26/04/2019	Cargo Unlocked / Incorrectly Loaded	Aircraft imbalance or lost of control	Remote	Major	Unacceptable	Service provider monitoring	Improbable	Major	Tolerable	Y	Y	NO-DCM-007	N/A	#152 #717 #863 #864 #906 #931 #933 #958 #982 #1028

04 - Passengers and Baggage

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
OP-04-01	26/04/2019	Passengers with build outside range (too large, too small, weight, etc.) or with reduced mobility	Trouble evacuating the aircraft in the event of an accident. Risk of remaining trapped in the aircraft	Improbable	Major	Tolerable	In addition to the application of the rules for the transport of passengers, insist in particular on the safety briefing, assign them a dedicated space which does not impede the evacuation of the other passengers. Signal their presence in the passenger manifest before departure to notify the rescue teams.	Improbable	Negligible	Acceptable	Y	Y	Cabin Manual	N/A	N/A
OP-04-02	26/04/2019	Boarding pass incorrect or inexistent	Security concern	Improbable	Major	Tolerable	Ensure that Security and Precautions described in Cabin Manual are accomplished	Extremily Improbable	Major	Acceptable	Y	Y	CM - 2.1.6	N/A	#374 #406 #784
OP-04-03	26/04/2019	Lack of Airport Security Control	Passengers with bad intentions may also be on board.	Improbable	Hazardous	Tolerable	Ensure that Security and Precautions described in Cabin Manual are accomplished	Improbable	Hazardous	Tolerable	Y	Y	CM - 2.1.6	N/A	#600 #753 #1009 #1012
OP-04-04	26/04/2019	Unruly passenger	Smoke on board. Trouble Makers. Drunk pax.	Occasional	Minor	Tolerable	Ensure that security training addresses issues related to unrully passenger	Occasional	Negligible	Acceptable	Y	Y	Programa de formação de segurança	N/A	#281 #696 #736 #987 #1003 #1036 #1038 #1041 #1042

05 - ATC

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
OP-05-01	24/04/2019	No NOTAM, ATC, weather information, Bird NOTAM…	Delay in the preparation and execution of the flights. Flight safety potentially undermined (no weather forecasts, nor any information on the ATC situation, etc.)	Remote	Hazardous	Unacceptable	Ensure that there are resources in place to obtain this kind of information. Ensure that this type of resource exists to obtain this type of information en route and on the destination and alternate aerodromes.	Improbable	Negligible	Acceptable	Y	Y	SOPS Dispatch	N/A	N/A
OP-05-02	24/04/2019	No ATC or Flight Information Service	No information on the other traffic in the area, no real-time control service, delay in triggering a protective measure in the event of an emergency or distress	Remote	Hazardous	Unacceptable	During the pre-flight briefing, insist on this point and the distribution of tasks and surveillance of the skies. During a flight, regular emission of auto-information message. Find an additional way to launch the alert just in case (staff on the ground, notify operations of the conduct required in the event of a delay, etc.)	Improbable	Hazardous	Tolerable	Newsletter of Chief Pilot about Communications.				N/A
OP-05-03	24/04/2019	Radio failure in flight	Loss of contact with ATC and other aircraft. Danger of mid-air collision by reduction of safety spaces	Remote	Hazardous	Unacceptable	Apply the procedure set out in the national regulations of the country over which you are flying. Provide a reminder of the required conduct in the OPS manual. Depending on the type of flight, insist on this point during the pre-flight briefing.	Improbable	Negligible	Acceptable	Newsletter of Chief Pilot about Communications.				N/A
OP-05-04	24/04/2019	Communication Breakdown between crew or ATC	mid-air collision	Remote	Catastrophic	Tolerable	The communication systems must be working properly mainly the emergency systems.	Improbable	Catastrophic	Acceptable	Newsletter of Chief Pilot about Communications.				#116 #118 #160 #200 #252 #290 #357 #403 #423 #617 #729 #754
OP-05-05	24/04/2019	Incorrect ATC instructions	Risk of CFIT or mid-air collision	Improbable	Catastrophic	Unacceptable	Counter-check the ATC instructions. In the event of any doubt, request confirmation from the ATC and propose another solution.	Improbable	Negligible	Acceptable	Newsletter of Chief Pilot about Communications.				N/A

06 - Pre and After Flight

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
OP-06-01	24/04/2019	Error in the configuration of this data in the system during flight	The weights and centre of gravity may be correct, but their entry into the system may contain an error (on entry) under pressures of time, change of route, etc.	Remote	Hazardous	Unacceptable	Cross-checking of the performance calculations between the crew members + verification of the validity and coherence of the data once entered in the FMS	Improbable	Negligible	Acceptable	Y	Y	OM A - 8.3.3	Loadsheet checked and approved	N/A
OP-06-02	24/04/2019	Altimeter setting error	Failure to respect the margins for clearing obstacles, which may lead to a CFIT	Remote	Hazardous	Unacceptable	Definition of a procedure to change the altimeter setting based on the flight phases. Cross-check compulsory between crew members for any change in the altimeter setting or the flight level or altitude. For aircraft equipped with radio altimeter, cross-check to verify the ground height. Make trainees aware of aircraft equipped with EGPWS and TAWS.	Improbable	Hazardous	Tolerable	Y	Y	OM A - 8.3.3	N/A	#645
OP-06-03	24/04/2019	Insufficient time for the pre-flight inspection	Failure to carry out this pre-flight inspection may prevent the detection of an anomaly or failure and jeopardise the safety of the flight.	Remote	Hazardous	Unacceptable	Do not fly if no crew member has made the pre-flight inspection	Improbable	Negligible	Acceptable	Y	Y	OM A - 1.4	Commander reponsabilitie	N/A

07 - Take-off and Climb

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
OP-07-01	30/04/2019	Take-off Configuration Warning	loss of flight control	Remote	Major	Tolerable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Improbable	Major	Acceptable	Y	Y	OM -D SIMULATOR PROFILE FDMM	N/A	#111 #123 #137 #141 #191

08 - Cruise

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
OP-08-01	24/04/2019	Excessive reactions on the controls by the pilot flying	Excessive manoeuvres, which may result from the competence of the pilot flying and which may lead to a loss of control of the aircraft	Remote	Hazardous	Unacceptable	Try to detect "excessive" behaviour by company pilots. Implement a program. Insist on standardisation during briefings and during retraining sessions.	Improbable	Major	Acceptable	In analysis				N/A
OP-08-02	24/04/2019	Line training: inappropriate reaction by the trainee	The instructor may be surprised by an unexpected reaction by the trainee. This event is more Tolerable if it occurs close to the ground and during delicate piloting phases.	Remote	Hazardous	Unacceptable	On training provide a reminder during the pre-flight briefing of the criteria for the instructor taking control (standardisation manual). Consider to take on board a 3rd crew member who will monitor and help on the conducting of the flight.	Improbable	Hazardous	Tolerable	Y	Y	Instrutors meeting	N/A	N/A
OP-08-03	24/04/2019	VORTEX	May lead to a loss of control of the aircraft	Remote	Hazardous	Unacceptable	Ensure that the minimums established for horizontal separation of aircraft are fulfilled, and compliance with ATC instructions	Extremly Improbable	Hazardous	Acceptable	Y	Y	OM - A 8.3.9	N/A	N/A
OP-08-04	24/04/2019	In-flight collision	Damage	Remote	Catastrophic	Unacceptable	Favour use of the TCAS. Provide a reminder during the briefing of the distribution of the tasks and the importance of sky surveillance. During a controlled flight (IFR or VFR), respect the published routes and the CTL instructions	Improbable	Catastrophic	Tolerable	In analysis				N/A
OP-08-05	24/04/2019	No more fuel usable in flight	Detour, countryside landing, or even engine flameout due to lack of fuel	Remote	Hazardous	Unacceptable	Draw up a strict policy for determining the minimum fuel quantity to take on board for the types of flight concerned. Define a policy for fuel management during the flight.	Improbable	Negligible	Acceptable	Y	Y	SOPS	N/A	#263
OP-08-06	24/04/2019	Fire, smoke or burning smell on board	Possibility of having a fire on board	Remote	Hazardous	Unacceptable	Ensuring that crews are trained to deal with such events	Remote	Major	Tolerable	Y	Y	OM - D	N/A	#131 #350 #416 #429 #544 #806 #948 #1048
OP-08-07	30/04/2019	Laser	Flight crew injury	Improbable	Hazardous	Tolerable	In situations of this nature always report to the ATC. Lower the chairs, do not look outside, use automatisms.	Improbable	Negligible	Acceptable	Y	Y	OM - A - 11	Safety recomendation	#147 #148 #393 #451

09 - Approach and Landing

Hazard no.	Revised on	Description	Specific nature of hazard	Likelihood	Severity	Result	Defences	Likelihood	Severity	Result	In place Y/N	DOC Y/N	REF Documentation	Additional measures or comments	Report ID
OP-09-01	22/05/2017	Unstabilised approach	Hard landings, bounced landings, runway excursions, overspeed flaps	Occasional	Hazardous	Tolerable	Description, in the standardisation manual, of the procedure for completing IFR and VFR approaches during the day and the night (single- and multi-engine) and the associated go-around criteria in the event of an incorrect presentation.	Occasional	Hazardous	Tolerable	Y	Y	SOPS	N/A	#211 #518 #615 #998
OP-09-02	29/04/2019	Tail strike	Structural Damage	Improbable	Hazardous	Tolerable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Improbable	Hazardous	Tolerable	Y	Y	OM -D SIMULATOR PROFILE FDMM	SPIS FDM	#449 #1002
OP-09-03	30/04/2019	GPWS / EGPWS Warning	loss of flight control	Occasional	Hazardous	Tolerable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Occasional	Hazardous	Tolerable	Y	Y	OM -D SIMULATOR PROFILE FDMM	SPIS FDM	#120 #125 #127 #129 #167 #176 #177 #181 #185 #198 #208 #285
OP-09-04	30/04/2019	Sink Rate	CFIT	Remote	Major	Tolerable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Improbable	Major	Acceptable	Y	Y	OM -D SIMULATOR PROFILE FDMM	SPIS FDM	#124 #187
OP-09-05	30/04/2019	High Aproach Speed	Hard landings, bounced landings, overspeed flaps	Remote	Majpr	Tolerable	Ensure that this hazard is addressed in the theoretical sessions and simulator training. Use the flight data monitoring programme for prevention and reduce this event.	Improbable	Major	Acceptable	Y	Y	OM -D SIMULATOR PROFILE FDMM	SPIS FDM	#237 #269 #336 #506