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MINISTERIO DE FOMENTO

AESA AGENCIA ESTATAL DE SEGURIDAD AÉREA

AGENCIA ESTATAL DE SEGURIDAD AÉREA

METHODOLOGY OF SAFETY ASSESSMENT FOR COMMERCIAL AIR TRANSPORT OPERATORS

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1. INTRODUCTION

The Annual Oversight Plan of the Spanish Aviation Safety and Security Agency (hereinafter referred to as AESA) establishes the regulatory control and oversight activities on civil aviation matters in order to ensure compliance with the regulations in air transport. This Plan shall take into account the priorities established by the Safety Committees of Commercial Air Transport, Aerial Works and General Aviation, Airports and Air Navigation.

The Safety Committees are high-level meetings chaired by the Director of the Agency, in which senior management and experts from AESA oversight units involved in operational and economic oversight are represented. The Committees, based on the information available from the safety assessment carried out through these methodologies, analyse and decide on the adoption of measures related to prevention and oversight in their field. They will meet on a scheduled basis at least three times a year.

This document includes the Methodology of Safety Assessment for Commercial Air Transport Operators, as a result of the application of the preventive approach[1] in the field of Commercial Air Transport operators. On one hand, the methodology is used to establish the prioritization of actions, including additional oversight activities as well as the necessary reallocation of resources. On the other hand, it facilitates the identification of areas susceptible to supervision, providing useful information to the oversight units for the development of their inspection tasks.

The results of this methodology shall be analysed and evaluated within the Safety Committee of Commercial Air Transport.

[1] The preventive approach complements the traditional approach, based primarily on compliance and oversight. This new approach is based on performance, risk management and safety assurance, and is process-oriented rather than just outcome-oriented.

2. OBJECTIVES AND SCOPE

2.1 OBJECTIVES

The objectives of this methodology are as follows:

- To establish numerical indicators to determine and measure safety-related parameters, values and evolutions, based on the oversight results of CAT operators as well as on events and occurrences that occurred during their activities.
- To obtain a periodic image of the operational safety level of each operator.
- To monitor the evolution of safety-related parameters.
- To determine the sector's safety trend.
- To identify the domains and the operators where, an appropriate approach of the oversight activity, could promote an improvement in safety.
- To adjust and focus the Annual Oversight Plan of AESA to the results of this analysis.
- To present the results of the analysis in a graphical, simple and intuitive way.

2.2 SCOPE

This methodology shall apply to all operators that hold an Air Operator Certificate (AOC) and an operating licence issued by AESA, according to the list published on AESA website. These operators could integrate in their fleet both airplanes and helicopters. They may also engage in other activities, such as special operator certificate (COE), specialized operations (SPO) or training organisations (ATO).

For the purposes of this methodology, CAT operators are grouped as follows:

- Operators Category A: includes operators that engage airplanes with maximum take-off mass greater than 10 tonnes and/or more than 20 seats for passenger, cargo and/or mail air services.
- Operators Category B-A: includes operators that engage airplanes with maximum take-off mass less than 10 tonnes and/or less than 20 seats for passenger, cargo and/or mail air services.
- Operators Category B-H: includes operators that engage helicopters for passenger, cargo and/or mail air services.

The separation of the operators in these three groups is due to the different types of aircraft used and as a consequence of the different applicable regulations (air operation, airworthiness and characteristics of the oversight tasks) that affect the behaviour and the distribution of the indicators.

3. INDICATORS DEFINITION

Two types of indicators are used:

- **Technical indicators:** measure the technical risk of the operator in terms of safety in the different domains in which its activity is divided:
  - Airworthiness: technical status of the fleet of aircraft engaged by the operator in commercial air transport, through the age and the heterogeneity of the fleet, the continuing airworthiness management organization, the aircraft airworthiness status and the maintenance centres.
  - Operations: technical status of the operator and its procedures, its management system, crews, training and operations in flight.
  - Ramp inspections (SANA and SAFA): are unannounced inspections on airport apron, usually between flights, where operational aspects, aircraft airworthiness, licenses, etc. are inspected. SANA inspections are inspections carried out by AESA on national operators, and SAFA inspections are inspections carried out by other authorities towards national operators.
  - Occurrence severity: measures the potential severity of the events and occurrences of the operator, referencing them to its exposure factor measured through the number of aircraft cycles of the operator.
  - Reporting culture: measures the operator's occurrence reporting culture by comparing the events reported by it to those reported by other entities.
- **Economic indicators:** measure the economic risk of the operator, taking into account its financial results and the operating environment of the company:
  - Liquidity: takes into account the liquidity ratio and the acid test of the operator
  - Short-term debt: takes into account the short-term solvency ratio, the short-term debt ratio and the quality of the debt.
  - Long-term debt: takes into account the leverage ratio, the long-term debt ratio, the financial independence ratio and the non-current assets funding coefficient.
  - De-capitalization: takes into account the pay-out ratio, the de-capitalization for its business group and the distribution of dividends
  - Profitability and cash flow: takes into account the operating margin, the return of equity, the return of assets and the cash flows on assets
  - Other factors in the operating environment: restructuring of the company or changes in the business model, anomalous personnel variations and(or) labour tensions, opening or closing of routes, declaration of suspension of payment or competition of creditors, major degradation of economic indicators (> 50%),...

The indicators used in this methodology are the following:

INDICATORS				
TYPE	**INDICATOR**	**SUB-INDICATOR**	**DOMAINS**	**DATA SOURCE**
TECHNICAL	Airworthiness	Age of the fleet	Airworthiness Fleet	Aircraft Registration Air Operator Certificate
		Age of the fleet design	Airworthiness Fleet	Aircraft Registration Air Operator Certificate
		Heterogeneity of the fleet	Airworthiness Fleet	Aircraft Registration Air Operator Certificate
		ACAM Programme - Aircraft continuing airworthiness monitoring	Airworthiness Aircrafts	ACAM Programme results
		CAMO Programme - Airworthiness management organisation monitoring	Airworthiness CAMO organisation	CAMO Oversight programme results
		P145 Programme – Part 145 maintenance organisation monitoring	Airworthiness Maintenance	P145 Oversight programme results
	AIR OPS Programme - Air operations continuing monitoring		Air operations Air operator certificate Training and crews	AIR OPS Oversight programme results
	SANA Programme – Safety Assessment of National Aircraft		Airworthiness Air operations	SANA Programme results
	SAFA Programme – Safety Assessment of Foreign Aircraft		Airworthiness Air operations	SAFA Programme results
	Occurrence severity		Safety occurrences Safety culture	ECCAIRS – European Coordination Centre for Accident and Incident Reporting Systems
	Reporting culture		Safety occurrences Safety culture	ECCAIRS – European Coordination Centre for Accident and Incident Reporting Systems
ECONOMIC	Economic	- Liquidity - Short-term debt - Long-term debt - De-capitalization - Profitability and cash flow - Other factors in the operating environment	Financial results Operating environment Operating licence	Economic supervision programme Operating environment information

In the following section the indicators and their formulas are defined.

3.1 AIRWORTHINESS INDICATOR

AIRWORTHINESS INDICATOR	
Acronym	**Definition**
i_{airw}	The airworthiness indicator is divided into five sub-indicators to cover the different airworthiness and maintenance domains. The following sub-indicators are defined: • Age of the fleet • Heterogeneity of the fleet • Design age of the fleet • ACAM • CAMO • Part 145

Calculation

The calculation of the airworthiness indicator consists on the weighted combination of the sub-indicators.

Three main areas have been taken into account for the weighting:

- Operator fleet (20%): age of the fleet (5%), design age of the fleet (5%) and heterogeneity of the fleet (10%)
- Airworthiness Management: ACAM (30%), CAMO (30%)
- Airworthiness Maintenance: P145 (20%)

Typology	Temporality	Domain
Continuous Compound Quantitative	**Periodicity of the calculation** The indicator is calculated three times a year (depending on the frequency of the Committee meetings)	Fleet Airworthiness management Airworthiness maintenance
	Data selection period The time period is different for each sub-indicator.	

Value range	Formula
No limit	$$i_{airw} = 0.05 \cdot i_{age}^{airw} + 0.05 \cdot i_{design}^{airw} + 0.10 \cdot i_{het}^{airw} + 0.30 \cdot i_{ACAM}^{airw} + 0.30 \cdot i_{CAMO}^{airw} + 0.20 \cdot i_{P145}^{airw}$$

The sub-indicators in which the airworthiness indicator is composed are defined below.

3.1.1 AGE OF THE FLEET

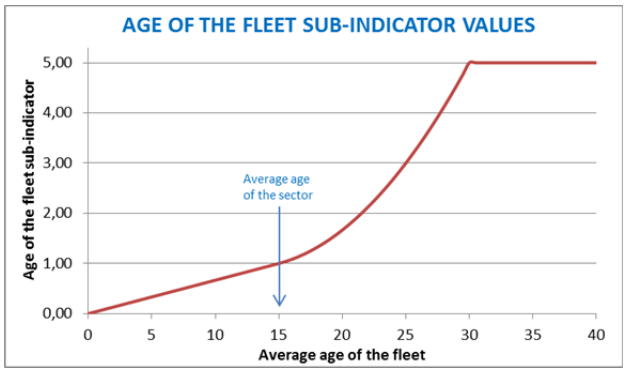
AGE OF THE FLEET SUB-INDICATOR	
Acronym	**Definition**
i_{age}^{airw}	Index to compare the average age of an operator's fleet with respect to the average age of all aircraft operating in the same sector. The time elapsed from the manufacture of the aircraft to the time of calculation of the index is defined as the age of the aircraft.

Calculation

The average age of an operator's fleet is calculated and compared to the average age of all aircraft operating in that sector.

Three sections are considered:

- Ages between 0 and the average age of the sector: the variation of the sub-indicator will be linear, taking values between 0 and 1.
- Ages between the average of the sector and 30 years: the value of the sub-indicator will grow quadratically up to a value of 5 for the average fleet age of 30 years. For the determination of this curve, the slope is kept constant at the point of the sector average and at that point the value of the sub-indicator is 1.
- Ages over 30 years: the value of the sub-indicator will be the maximum, 5.



Typology	Temporality	Domain
Continuous Simple Quantitative	**Periodicity of the calculation** The indicator is calculated once a year **Data selection period** Not applicable in this indicator	Airworthiness Fleet

Value range	Formula
0-5	Being A=Average age of the sector and X= Average age of the operator's aircrafts. If X < A → $i_{age}^{airw} = \frac{X}{A}$ If X > A → $i_{age}^{airw} = \frac{5 \cdot A - 30}{(30-A)^2} \cdot \left(\frac{X^2}{A} + \frac{X \cdot (30-A)^2}{A \cdot (5 \cdot A - 30)} - 2X + A\right)$

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3.1.2 DESIGN AGE OF THE FLEET

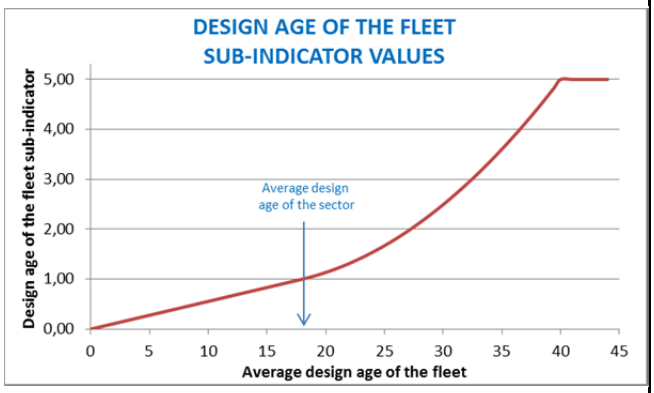
DESIGN AGE OF THE FLEET SUB-INDICATOR	
Acronym	**Definition**
i_{design}^{airw}	Index to compare the average age of the Type Certificates of an operator's fleet with respect to the average age of all TC of the aircraft operating in the same sector. The time elapsed from the approval of the Type Certificate of the aircraft to the time of calculation of the index is defined as the design age of the aircraft.

Calculation

The average design age of an operator's fleet is calculated and compared to the average designs age of all aircraft operating in that sector.

Three sections are considered:

- Ages between 0 and the average design age of the sector: the variation of the sub-indicator will be linear, taking values between 0 and 1.
- Ages between the average of the sector and 40 years: the value of the sub-indicator will grow quadratically up to a value of 5 for the average design age of 40 years. For the determination of this curve, the slope is kept constant at the point of the sector average and at that point the value of the sub-indicator is 1.
- Ages over 40 years: the value of the sub-indicator will be the maximum, 5.



Typology	Temporality	Domain
Continuous Simple Quantitative	**Periodicity of the calculation** The indicator is calculated once a year **Data selection period** Not applicable in this indicator	Airworthiness Fleet

Value range	Formula
0-5	Being A=Average design age of the sector and X= Average design age of the operator's aircrafts. If X < A → $i_{design}^{airw} = \frac{X}{A}$ If X > A → $i_{design}^{airw} = \frac{5 \cdot A - 40}{(40-A)^2} \cdot \left(\frac{X^2}{A} + \frac{X(40-A)^2}{A(5 \cdot A - 40)} - 2X + A\right)$

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3.1.3 HETEROGENEITY OF THE FLEET

HETEROGENEITY OF THE FLEET SUB-INDICATOR	
Acronym	**Definition**
i_{het}^{airw}	Index that measures the heterogeneity of the models (different Type Certificate) in the fleet of an operator, taking into account the different types of operation declared in the AOC and the different types of aircraft required for each type of operation.

Calculation

The calculation consists on relating the number of different TC with the total amount of aircrafts in the fleet of the operator, and corrected by a weighting factor that considers the different types of operations carried out by the operator.

The **Operation Factor** takes values between 2 and 0,5 depending on the possible combinations of four types of operation:.

- Passengers CAT Operations:
  - Aircrafts with MEW < 75.000 Kg (short and medium range)
  - Aircrafts with MEW > 75.000 Kg (long range)
- Cargo CAT Operations:
  - Aircrafts with MEW <10.000 Kg (packages)
  - Aircrafts with MEW >10.000 Kg (containers)

The Operation Factor is calculated filling the following table:

Type of operation	Passenger CAT	Passenger CAT	Cargo CAT	Cargo CAT	**Operation Factor**
Type of aircraft	MEW > 75.000 kg	MEW < 75.000 kg	MEW > 10.000 kg	MEW < 10.000 kg	
***Y= 1** when an operator carries out that type of operation* ***Y=0** when an operator does not carry out that type of operation*	Y	Y	Y	Y	$f_o = \frac{2}{\sum Y}$

Typology	Temporality	Domain
Continuous Simple Quantitative	**Periodicity of the calculation** The indicator is calculated once a year **Data selection period** Not applicable in this indicator	Airworthiness Fleet

Value range	Formula
0-5	$i_{het}^{airw} = 5 \cdot f_o \frac{\sum Number\ of\ TC - 1}{\sum Number\ of\ aircrafts}$

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3.1.4 ACAM SUB-INDICATOR

ACAM SUB-INDICATOR		
Acronym	**Definition**	
i_{ACAM}^{airw}	Index that measures the results of the ACAM Programme: Aircraft continuing airworthiness monitoring.	
Calculation		
In order to calculate this sub-indicator, the ACAM inspections carried out to the operator's aircrafts during the data selection period are identified, and the findings in those inspections are counted. The sub-indicator is calculated as a rate of findings in each inspection, giving different weights to the findings depending on their category and their closing. **Category Factor**: findings are classified by the oversight unit as category 1 or 2, depending on their gravity. The category factor gives to each finding the following value depending on the category assigned: ▪ Category 1 – Category factor = 3 ▪ Category 2 – Category factor = 1 **Closing Factor:** the findings of each inspection shall be closed and corrected by the operator. The closing factor assigns the following values in cases where findings remain open or closed: • Open finding – Closing factor = 1.0 • Closed finding – Closing factor = 0.75		
Typology	**Temporality**	**Domain**
Continuous Simple Quantitative	**Periodicity of the calculation** The indicator is calculated three times a year (depending on the periodicity of the Committee meetings)	Airworthiness Aircrafts
	Data selection period Two years since the date when sub-indicator is calculated.	
Value range	**Formula**	
No limit	$$i_{ACAM}^{airw} = \frac{3 \cdot \sum(F_c \cdot Findings\ Cat1) + \sum(F_c \cdot Findings\ Cat2)}{\sum ACAM\ inspections}$$	

3.1.5 CAMO SUB-INDICATOR

CAMO SUB-INDICATOR	
Acronym	**Definition**
i_{CAMO}^{airw}	Index that measures the results of the CAMO Programme: Continuing airworthiness management organisation monitoring.

Calculation

In order to calculate this sub-indicator, the CAMO inspections/audits carried out to the airworthiness management organisation of the operator during the data selection period are identified, and the findings in those inspections/audits are counted.
The results of audits carried out at the request of the organization are not taken into account.

The sub-indicator is calculated as a rate of findings in each inspection/audit, giving different weights to the findings depending on their category and their closing.

Category Factor: findings are classified by the oversight unit as category 1 or 2, depending on their gravity.
The category factor gives to each finding the following value depending on the category assigned:

- Category 1 – Category factor = 3
- Category 2 – Category factor = 1

Closing Factor: the findings of each inspection shall be closed and corrected by the operator. The closing factor assigns the following values in cases where findings remain open or closed:

- Open finding – Closing factor = 1.0
- Closed finding – Closing factor = 0.75

Typology	Temporality	Domain
Continuous Simple Quantitative	**Periodicity of the calculation** The indicator is calculated three times a year (depending on the periodicity of the Committee meetings)	Airworthiness CAMO Org.
	Data selection period Two years since the date when sub-indicator is calculated.	

Value range	Formula
No limit	$$i_{CAMO}^{airw} = \frac{3 \cdot \sum(F_c \cdot Findings\ Cat1) + \sum(F_c \cdot Findings\ Cat2)}{\sum CAMO\ inspections}$$

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3.1.6 P145 SUB-INDICATOR

Part 145 SUB-INDICATOR		
Acronym	**Definition**	
i_{P145}^{airw}	Index that measures the results of the Part 145 Programme: maintenance centres continuing monitoring.	
Calculation		
In order to calculate this sub-indicator, the Part 145 inspections carried out to the maintenance centres where the operator performs its aircraft maintenance during the data selection period are identified, and the findings in those inspections are counted. The results of audits carried out at the request of the organization are not taken into account. The sub-indicator is calculated as a rate of findings in each inspection, giving different weights to the findings depending on their category and their closing. **Category Factor**: findings are classified by the oversight unit as category 1 or 2, depending on their gravity. The category factor gives to each finding the following value depending on the category assigned: ▪ Category 1 – Category factor = 3 ▪ Category 2 – Category factor = 1 **Closing Factor:** the findings of each inspection shall be closed and corrected by the operator. The closing factor assigns the following values in cases where findings remain open or closed: • Open finding – Closing factor = 1.0 • Closed finding – Closing factor = 0.75		
Typology	**Temporality**	**Domain**
Continuous Simple Quantitative	**Periodicity of the calculation** The indicator is calculated three times a year (depending on the periodicity of the Committee meetings)	Airworthiness Maintenance centres
	Data selection period Two years since the date when sub-indicator is calculated.	
Value range	**Formula**	
No limit	$$i_{P145}^{airw} = \frac{3 \cdot \sum(F_c \cdot \boldsymbol{Findings\ Cat1}) + \sum(F_c \cdot \boldsymbol{Findings\ Cat2})}{\sum \boldsymbol{P145\ inspections}}$$	

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3.2 AIR OPERATIONS INDICATOR

AIR OPERATIONS INDICATOR	
Acronym	**Definition**
i_{OPS}	Index that measures the results of the AIR OPS Programme: air operations continuing monitoring

Calculation

In order to calculate this sub-indicator, the AIR OPS inspections/audits carried out to the operator during the data selection period are identified, and the findings in those inspections/audits are counted.
Actions carried out at the request of the organization like Manuals revisions are not taken into account.

The sub-indicator is calculated as a rate of findings in each inspection/audit, giving different weights to the findings depending on their category and their closing.

Category Factor: findings are classified by the oversight unit as category 1 or 2, depending on their gravity.
The category factor gives to each finding the following value depending on the category assigned:

- Category 1 – Category factor = 3
- Category 2 – Category factor = 1

Closing Factor: the findings of each inspection shall be closed and corrected by the operator. The closing factor assigns the following values in cases where findings remain open or closed:

- Open finding – Closing factor = 1.0
- Closed finding – Closing factor = 0.75

Typology	Temporality	Domain
Continuous Simple Quantitative	**Periodicity of the calculation** The indicator is calculated three times a year (depending on the periodicity of the Committee meetings)	Air operations AOC Training and crews
	Data selection period Two years since the date when sub-indicator is calculated.	

Value range	Formula
No limit	$$i_{OPS} = \frac{3 \cdot \sum(F_c \cdot \boldsymbol{Findings\ Cat1}) + \sum(F_c \cdot \boldsymbol{Findings\ Cat2})}{\sum \boldsymbol{AIR\ OPS\ inspections}}$$

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3.3 RAMP INSPECTIONS – SAFA INDICATOR

SAFA INDICATOR	
Acronym	**Definition**
i_{SAFA}	Index that measures the results of the SAFA Programme: safety assessment of foreign aircraft

Calculation

In order to calculate this sub-indicator, the SAFA inspections carried out to the operator by other EU authorities during the data selection period are identified, and the findings in those inspections are counted.
The indicator is calculated as a rate of findings in each inspection, giving different weights to the findings depending on their category.

Category Factor: findings are classified by the oversight unit as category 1, 2 or 3, depending on their gravity.
The category factor gives to each finding the following value depending on the category assigned:

- Category 1 – Category factor = 0.25
- Category 2 – Category factor = 1
- Category 3 – Category factor = 3

Typology	Temporality	Domain
Continuous Simple Quantitative	**Periodicity of the calculation** The indicator is calculated three times a year (depending on the periodicity of the Committee meetings)	Airworthiness Air operations
	Data selection period A year since the date when sub-indicator is calculated.	

Value range	Formula
No limit	$$i_{SAFA} = \frac{0.25 \cdot \sum Findings\ CAT1 + \sum Findings\ CAT2 + 3 \cdot \sum Findings\ CAT3}{\sum SAFA\ inspections}$$

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3.4 RAMP INSPECTIONS – SANA INDICATOR

SANA INDICATOR	
Acronym	**Definition**
i_{SANA}	Index that measures the results of the SANA Programme: safety assessment of national aircraft

Calculation

In order to calculate this sub-indicator, the SANA inspections carried out to the operator by AESA during the data selection period are identified, and the findings in those inspections are counted.
The sub-indicator is calculated as a rate of findings in each inspection, giving different weights to the findings depending on their category.

Category Factor: findings are classified by the oversight unit as category 1, 2 or 3, depending on their gravity.
The category factor gives to each finding the following value depending on the category assigned:

- Category 1 – Category factor = 0.25
- Category 2 – Category factor = 1
- Category 3 – Category factor = 3

Typology	Temporality	Domain
Continuous Simple Quantitative	**Periodicity of the calculation** The indicator is calculated three times a year (depending on the periodicity of the Committee meetings)	Airworthiness Air operations
	Data selection period A year since the date when sub-indicator is calculated.	

Value range	Formula
No limit	$$i_{SANA} = \frac{0.25 \cdot \sum Findings\ CAT1 + \sum Findings\ CAT2 + 3 \cdot \sum Findings\ CAT3}{\sum SANA\ inspections}$$

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3.5 OCCURRENCE SEVERITY INDICATOR

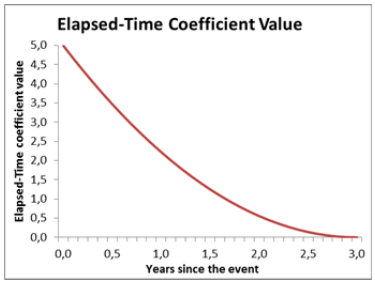
OCCURRENCE SEVERITY INDICATOR	
Acronym	**Definition**
i_{sev}	Index that quantifies the severity of the events and occurrences suffered by an operator, taking into account its volume of operations.

Calculation

The occurrences and events that occur to each operator in a reference period are selected and are related to their number of cycles during that reference period. For its calculation it is taken into account:

- **Number of cycles**: number of landing-take off cycles during the reference period officially reported by the operator.
- **Severity coefficient:** depending on the severity category of each event:
  - Accident - Severity coefficient = 10
  - Serious incident - Severity coefficient = 5
  - Major incident - Severity coefficient = 1
  - Significant incident – Severity coefficient = 0.05
- **Elapsed-Time coefficient:** this coefficient is defined to dissipate the penalty of the events over time. Each event is considered for three years, and the weight of its penalty is distributed according to the following function:

$$\text{Coef}_{\text{E-T}} = \frac{(\text{Years since the event} - 3)^2}{1{,}8}$$



Finally, when the indicator value reaches more than 10, an asymptote is calculated so that in no case the value 15 is exceeded.

Typology	Temporality	Domain
Continuous Simple Quantitative	**Periodicity of the calculation** The indicator is calculated three times a year (depending on the periodicity of the Committee meetings)	Safety occurrences Safety culture
	Data selection period Three years since the date when sub-indicator is calculated.	

Value range	Formula
0-15	$$i_{sev}{}^{calculated} = \frac{\sum_{incidents} Coef_{sev} \cdot Coef_{E-T}}{Number\ Cycles/1000}$$

$$\begin{cases} If\ i_{sev}{}^{calculated} \leq 10 & i_{sev} = i_{sev}{}^{calculated} \\ If\ i_{sev}{}^{calculated} > 10 & i_{sev} = 15 - \frac{25}{i_{sev}{}^{calculated} - 5} \end{cases}$$

3.6 REPORTING CULTURE INDICATOR

REPORTING CULTURE INDICATOR	
Acronym	**Definition**
i_{cult}	Index that quantifies the reporting culture of each operator, by measuring the percentage of events in which an operator has been involved in relation to those notified by the operator

Calculation

The occurrences and events that occur to each operator in a reference period are selected and are related to the reporting entity of each of the events.
The following events are considered:

- Events located in Spain
- Events with severity category greater or equal to *Significant incident*
- Events from a year since the data calculation date
- Events with registration identified

The indicator is calculated by measuring the percentage of events that are notified by the operator itself.
For the calculation of the indicator, the following coefficient is taken into account:

- Volume of events coefficient: the value taken by this coefficient depends on the quantity of reportable events:
  - 5 or more reportable events - Coefficient value = 1
  - 4 or fewer reportable events - Coefficient value = 1- (reportable events) / 5

Typology	Temporality	Domain
Continuous Simple Quantitative	**Periodicity of the calculation** The indicator is calculated three times a year (depending on the periodicity of the Committee meetings)	Safety occurrences Safety culture
	Data selection period A year since the date when sub-indicator is calculated.	

Value range	Formula
0-5	$$i_{cult} = 5 \cdot Coef_{vol} \cdot \left(1 - \frac{\sum Incidents\ of\ the\ operator_{notified\ by\ itself}}{\sum Incidents\ of\ the\ operator_{all}}\right)$$

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3.7 TECHNICAL INDICATOR

The technical indicator unifies all the technical indicators under a single indicator. Its mission is to facilitate the representation of the risk-status and the evolution and trend of each operator in the Safety Risk Area.

TECHNICAL INDICATOR	
Acronym	**Definition**
i_{tech}	This indicator measures the technical risk of the operator in terms of safety in the different domains in which its activity is divided: airworthiness, air operations, ramp inspections (SANA and SAFA, occurrence severity and reporting culture.

Calculation

Its value results from the weighting of the six technical indicators described in the previous sections.

The value of the weighting factors shall be adjusted for the purpose of:

- Prioritizing some indicators against others (depending on the category of the operators and the reliability of the data used for their calculation)
- Optimizing the representation of the position the operators in the Safety Risk Area

The weighting factors of the indicators has been analysed to meet these objectives and the following values have been determined:

WEIGHTING FACTORS OF THE TECHNICAL INDICATOR						
CATEGORY	f_{airw}	f_{ops}	f_{sana}	f_{safa}	f_{sev}	f_{cult}
CAT A	0.20	0.20	0.10	0.10	0.20	0.20
CAT B - Airplanes	0.20	0.20	0.10	0.10	0.20	0.20
CAT B - Helicopters	0.25	0.25	0.00	0.00	0.25	0.25

Typology	Temporality	Domain
Continuous Composed Quantitative	**Periodicity of the calculation** The indicator is calculated three times a year (depending on the periodicity of the Committee meetings) **Data selection period** Depending on each indicator	Airworthiness Air Operations Ramp inspections Safety occurrences Safety culture

Value range	Formula
No limit	$$i_{tech} = \frac{f_{airw} \cdot i_{airw} + f_{ops} \cdot i_{ops} + f_{sana} \cdot i_{sana} + f_{safa} \cdot i_{safa} + f_{sev} \cdot i_{sev} + f_{cult} \cdot i_{cult}}{6}$$

3.8 ECONOMIC INDICATOR

ECONOMIC INDICATOR		
Acronym	**Definition**	
i_{eco}	This indicator takes into account financial and operational parameters of each operator. The objective is to identify the total value of the company and the financial risk it faces for each reference period.	
Calculation		
This indicator takes into account the following parameters: liquidity, short-term debt, long-term debt, de-capitalization, profitability and cash flow, and other factors in the operating environment: restructuring of the company or changes in the business model, anomalous personnel variations, opening or closing of routes, declaration of suspension of payment or competition of creditors, major degradation of economic indicators, etc. The calculation of the indicator is included in appendix 1 of the methodology.		
Typology	**Temporality**	**Domain**
Continuous Composed Quantitative	**Periodicity of the calculation** The indicator is calculated three times a year (depending on the periodicity of the Committee meetings)	Economic and financial results Operational environment
	Data selection period A year since the date when sub-indicator is calculated.	
Value range	**Formula**	
0-5	The calculation of the indicator is included in appendix 1 of the methodology.	

4. GRAPHICAL REPRESENTATION OF INDICATORS

In order to show the results of the assessment analysis of the safety level of Commercial Air Transport operators, a set of graphs have been defined as follows:

- Safety Risk Area
- Technical Safety Area
- Comparison of the value of an indicator for all operators in a category
- Status and evolution of the indicators of an operator
- ACAM Area
- CAMO Area
- P145 Area
- OPS Area
- SAFA-SANA Area
- OCCURRENCE Area
- ECONOMIC Area

These graphs are displayed in a seasonal way (a fixed photograph of the status of the CAT operators at a given moment in order to identify negative situations) and in a temporary way (evolution of the indicators of an operator in order to identify negative trends). It has been intended these representations to be simple and intuitive.

4.1 SAFETY RISK AREA

The purpose of this representation is to relate the economic and the technical status of the operators by positioning them in a common area that allows comparing the behaviour of operators of the same category.

It is defined with a pair of Cartesian axes with maximum values of 5 units in each axis. These axes delimit the area where the cloud of points formed by the positions that the operators take, and which is referred to as the Safety Risk Area.

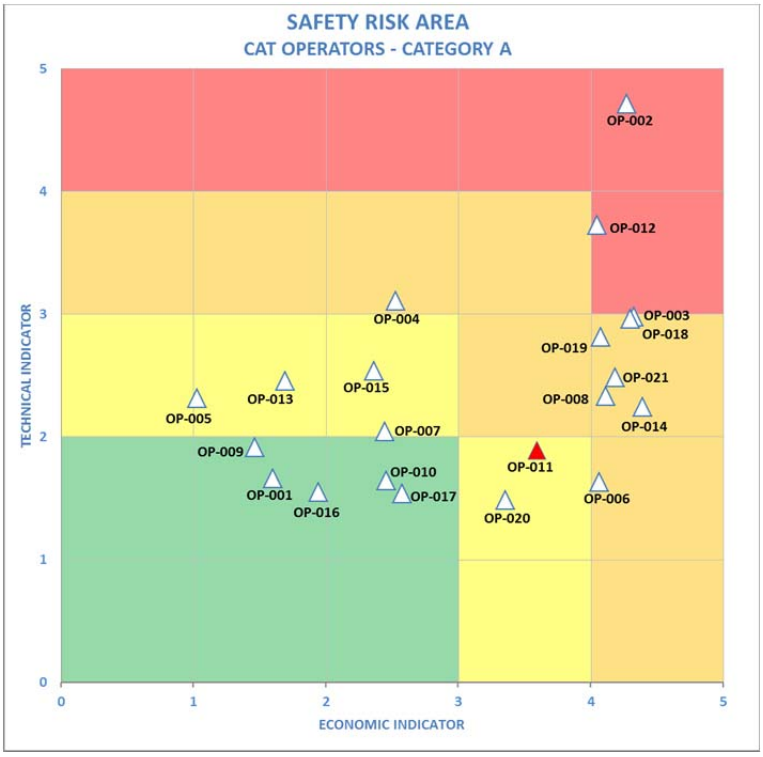
It is considered a specific Safety Risk Area for each of the categories of operators (Category A, Category B-Aeroplane, Category B-Helicopter), where operators belonging to the same category are grouped.

The Safety Risk Area defines four types of zones: critical, serious, negative and satisfactory.

4.1.1 SEASONAL REPRESENTATION

The seasonal representation shows a photograph of the safety status of the operators at a given analysis time.

The position of each operator is defined by a point whose value in ordinates takes the value of the technical indicator and in abscissa the value of the economic indicator. The operator positions are marked with a white triangle. The operators which have suffered accidents with fatalities in the last three years have their triangle filled in red (in the following graph, the operator 11) with the aim of highlighting them to carry out a deeper monitoring of their evolution.



SAFETY RISK AREA	
	Critical zone
	Serious zone
	Negative zone
	Satisfactory zone
△	CAT Operator
▲	CAT Operator with fatal accident

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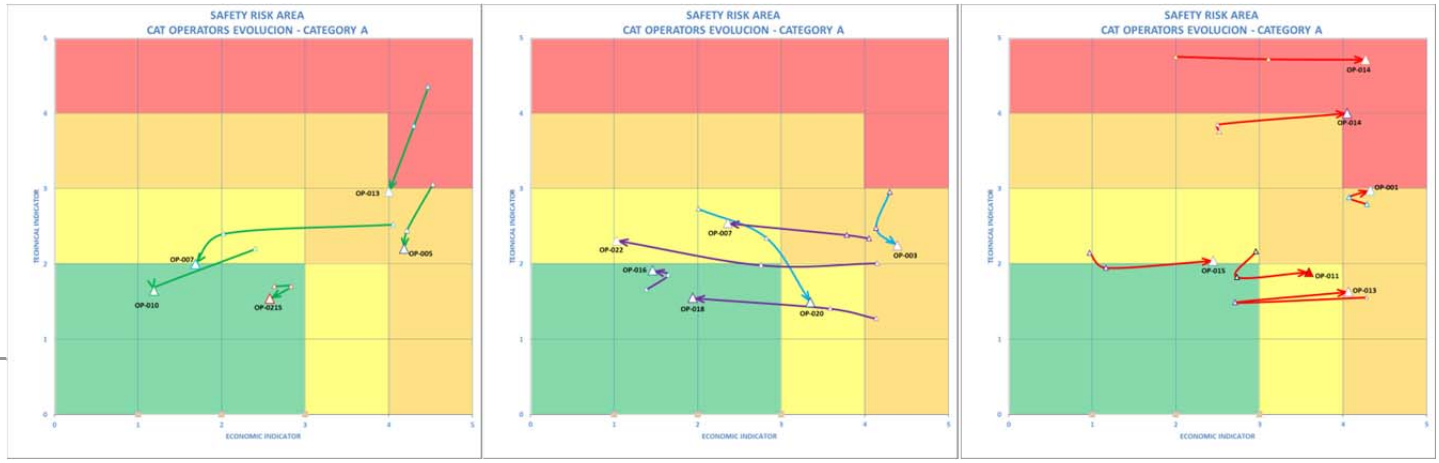
4.1.2 TEMPORARY EVOLUTION REPRESENTATION

From the position of an operator at different times of calculation, it is possible to define the evolution and trend of an operator in the Safety Risk Area. In this way, negative trends can be identified in operators that present a safety risk.

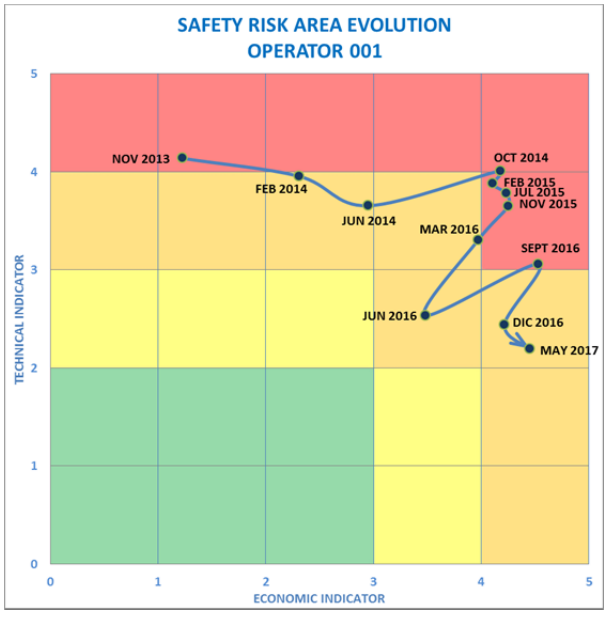
Four types of evolution are distinguished:

- Satisfactory evolution: economic and technical improvement
- Combined evolution: economic improvement and technical worsening, or technical improvement and economic worsening
- Negative evolution: economic and technical worsening

SAFETY RISK AREA - EVOLUTIONS		
Evolution	Technical Ind	Economic Ind
→	IMPROVEMENT	WORSENING
→	EMPEORA	WORSENING
→	IMPROVEMENT	WORSENING
→	WORSENING	IMPROVEMENT



It is also possible to analyse an individual evolution of an operator along all the different assessments performed in the last years in order to see the effectiveness of the preventive actions carried out.



4.2 TECHNICAL SAFETY AREA

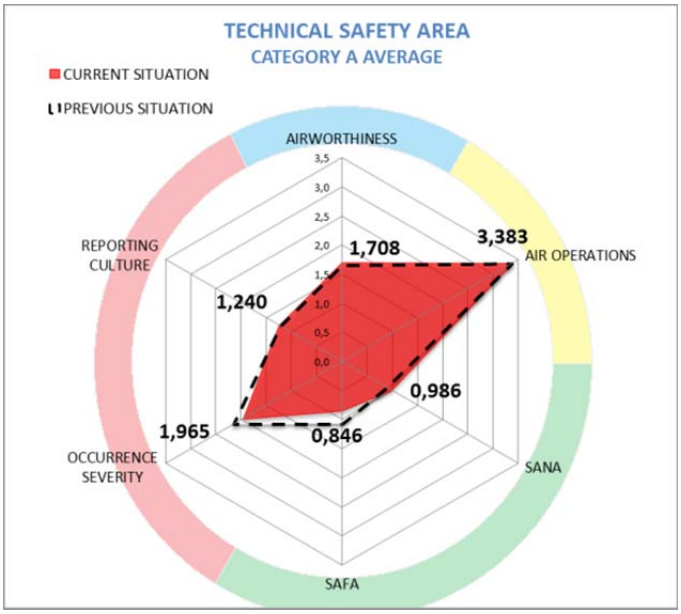
The purpose of this representation is to show the value of the six technical indicators in a simple and grouped way.

It is called the Technical Safety Area and it is defined as the area limited by the values that take the six technical indicators of reference. As defined in previous sections, the higher the value of the indicators, the lower the level of safety in the respective domain. Therefore, the greater the Technical Safety Area is, the lower safety level.

4.2.1 CATEGORY AVERAGE REPRESENTATION AND EVOLUTION

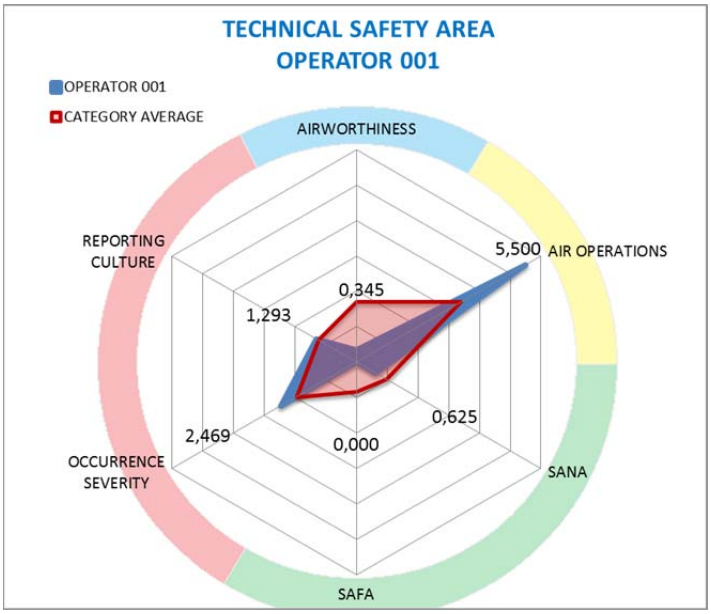
Using the average values of the indicators, the representation of the Technical Safety Area for a category is obtained, so that the areas with the most deficiencies in the safety of a certain category can be easily identified.

In addition, the representation can be used to superimpose the previous state of the Technical Safety Area in order to identify the evolution of the entire sector.



4.2.2 COMPARISON BETWEEN AN OPERATOR AND THE WHOLE CATEGORY

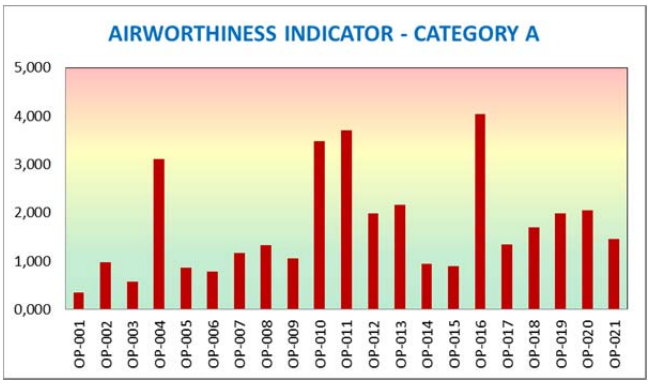
From the values of the indicators of an operator it is possible to compare its Technical Safety Area with the average of the category, in such a way that in the points where its area is greater than the average one, it can be identified a worse state of safety in this area.



4.3 COMPARISON OF A SINGLE INDICATOR FOR DIFFERENT OPERATORS

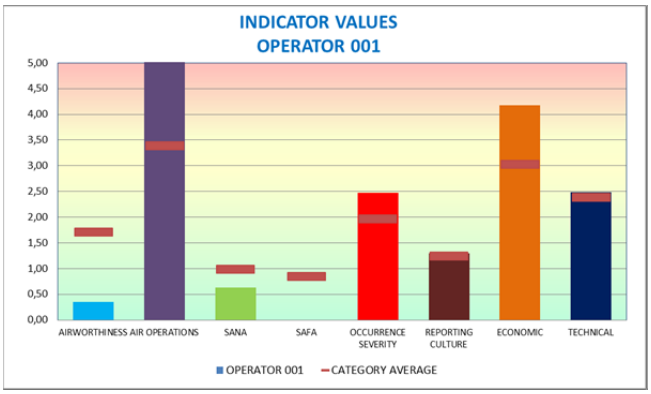
The purpose of this representation is to show the values that a single indicator takes for all operators in the category.

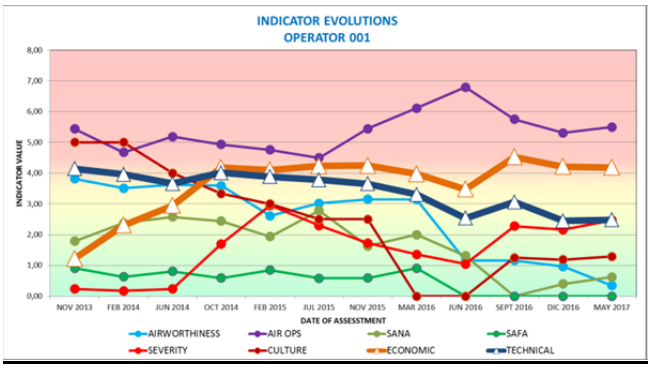
This representation is used to include a classification of the operators according to the value of the indicator, so that the operators that are worse off within each area can be clearly identified.



4.4 STATUS AND EVOLUTION OF THE INDICATORS OF AN OPERATOR

The purpose of these representations is to show the value taken by the different indicators of an operator at a given time, as well as its evolution.





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4.5 ACAM AREA

The purpose of this representation is to provide information of the airworthiness monitoring activities included in the ACAM programme.

The inspections are focused on the Key Risk Elements (KREs) that are used to plan and analyse the inspections within the ACAM programme. This representation should:

- Show the monitoring results of the aircrafts of an operator, through the ratio of findings in one of the KREs to the total of findings in all KREs for that operator.
- Compare the results of the operator with the average of all the operators in the same category.
- Highlight the KREs where the operator or the category has more problems.

4.5.1 DEFINITION OF THE KEY RISK ELEMENTS OF AIRWORTHINESS - KRES

Listed below are the KREs in which findings will be classified:

A. AIRCRAFT CONFIGURATION

A.1. Type design and modifications
A.2. Airworthiness limitations
A.3. Airworthiness directives

B. AIRCRAFT OPERATION

B.1. Aircraft documentation
B.2. Flight manual
B.3. Weight and balance
B.4. Marks and signs
B.5. Operational requirements
B.6. Defect management

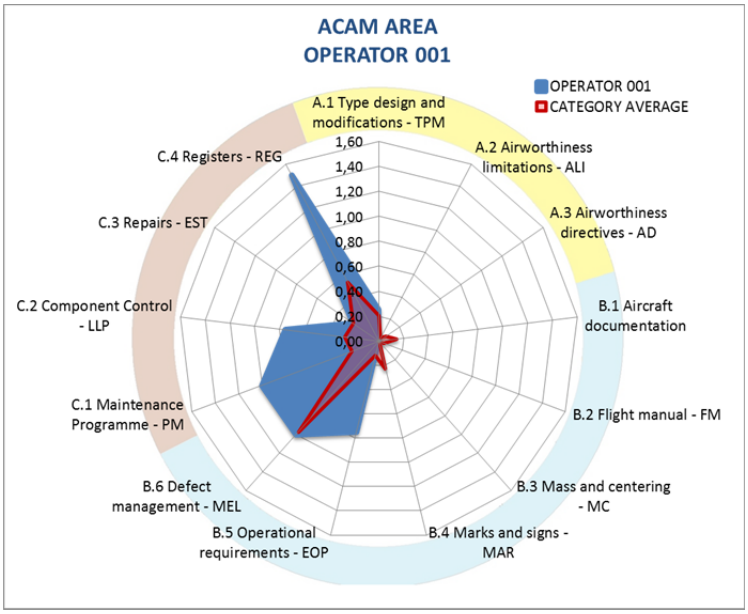
C. AIRCRAFT MAINTENANCE

C.1. Maintenance Programme
C.2. Component control
C.3. Repairs
C.4. Registers

4.5.2 REPRESENTATION OF THE FINDINGS IN EACH KRE

The value assigned for each KRE is the ratio of findings per inspection assigned to each KRE.

The representation is a polygon of as many vertices as KRE has been defined, whose area is limited by the values that take the different ratios for each KRE; so the smaller the area is, the better the state of airworthiness safety is.



4.6 CAMO AREA

The purpose of this representation is to provide information of the airworthiness management organization monitoring activities included in the CAMO programme.

The inspections are focused on different audit areas that are used to plan and analyse the inspections within the CAMO programme. This representation should:

- Show the monitoring results of the airworthiness management organisation an operator, through the ratio of findings in each audit areas defined
- Compare the results of the operator with the average of all the operators in the same category.
- Highlight the audit areas where the operator or the category has more problems.

4.6.1 DEFINITION OF THE AUDIT AREAS WITHIN THE CAMO PROGRAMME

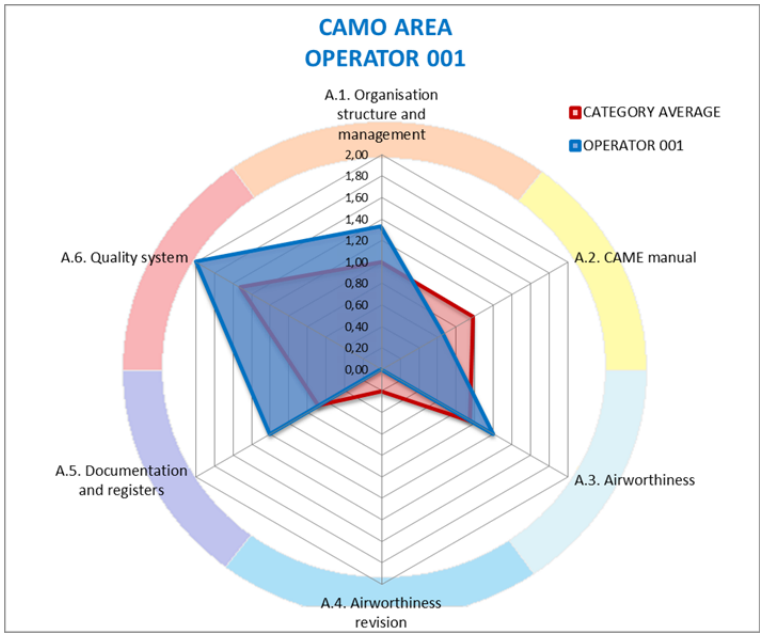
Listed below are the audit areas in which findings will be classified:

A. Organisation structure and management
B. CAME Manual
C. Airworthiness maintenance management
D. Airworthiness revision
E. Documentation and registers
F. Quality system

4.6.2 REPRESENTATION OF THE FINDINGS IN EACH AUDIT AREA

The value assigned for each audit area is the ratio of findings per inspection assigned to each audit area.

The representation is a polygon of as many vertices as audit area has been defined, whose area is limited by the values that take the different ratios for each audit area; so the smaller the area is, the better the safety status in the airworthiness management organisation is.



4.7 PART 145 AREA

The purpose of this representation is to provide information of the airworthiness maintenance centres monitoring activities included in the Part 145 programme.

The inspections are focused on different audit areas that are used to plan and analyse the inspections within the P145 programme. This representation should:

- Show the monitoring results of the airworthiness maintenance centres related with an operator, through the ratio of findings in each audit areas defined
- Compare the results of the operator with the average of all the operators in the same category.
- Highlight the audit areas where the operator or the category has more problems.

4.7.1 DEFINITION OF THE AUDIT AREAS WITHIN THE P145 PROGRAMME

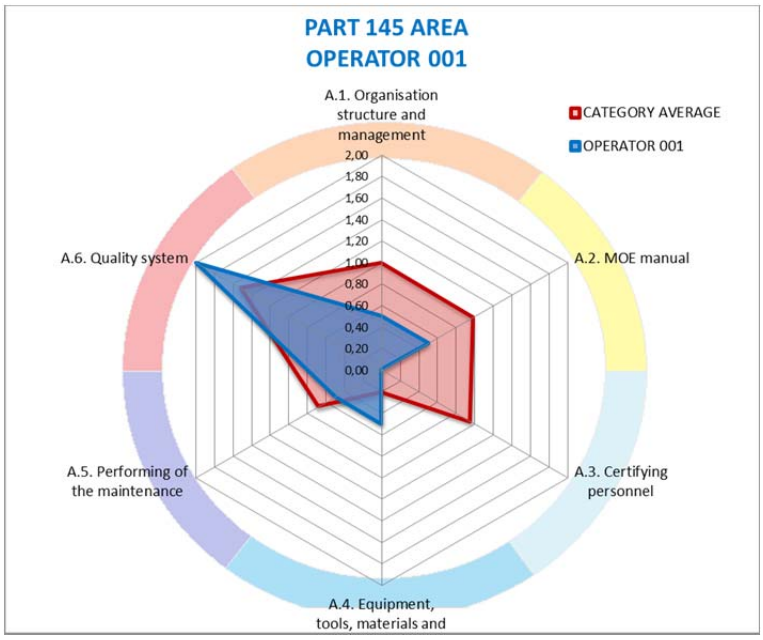
Listed below are the audit areas in which findings will be classified:

A. Organisation structure and management
B. MOE Manual
C. Certifying personnel
D. Equipment, tools, material and components
E. Performing of the maintenance
F. Quality system

4.7.2 REPRESENTATION OF THE FINDINGS IN EACH AUDIT AREA

The value assigned for each audit area is the ratio of findings per inspection assigned to each audit area.

The representation is a polygon of as many vertices as audit area has been defined, whose area is limited by the values that take the different ratios for each audit area; so the smaller the area is, the better the safety status in the airworthiness management organisation is.



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4.8 AIR OPS AREA

The purpose of this representation is to provide information of the air operations monitoring activities included in the AIR OPS programme.

The inspections and audits are focused on different domains that are used to plan and analyse the inspections within the AIR OPS programme. This representation should:

- Show the monitoring results of the air operations of an operator, through the ratio of findings in each domain defined
- Compare the results of the operator with the average of all the operators in the same category.
- Highlight the domains where the operator or the category has more problems.

4.8.1 DEFINITION OF THE AUDIT AREAS AND THE DOMAINS OF THE AIR OPS PROGRAMME

The monitoring of the compliance with the applicable requirements, which is carried out during the AIR OPS programme, is carried out through different audits and product inspections.

A1. Audit of operator organisation
A2. Audit of compliance control
A3. Audit of safety management
A4. Audit of flight preparation, support, monitoring and control
A5. Audit of crew scheduling
A6a. Audit of flight crew training and verification
A6b. Audit of cabin crew training and verification
A7a. Audit of air operations – Flight deck
A7b. Audit of air operations – Passenger cabin
A8. Audit of ground handling operations
A9. Audit of aircraft equipment
A10. Audit of dangerous goods
I1. Inspection of station
I2. Inspection of flight dispatch and tracking
I3a. Inspection of air ops registers – Flight registers
I3b. Inspection of air ops registers – FTL registers
I4. Inspection of competence and line verifications
I5. Inspection of training registers
I6a. Inspection of training - Flight crew
I6b. Inspection of training - Cabin crew
I6c. Inspection of training – In flight and simulators
I7. En-route inspection – Flight deck
I8. En-route inspection – Passenger cabin
I9. Inspection of ground handling operations

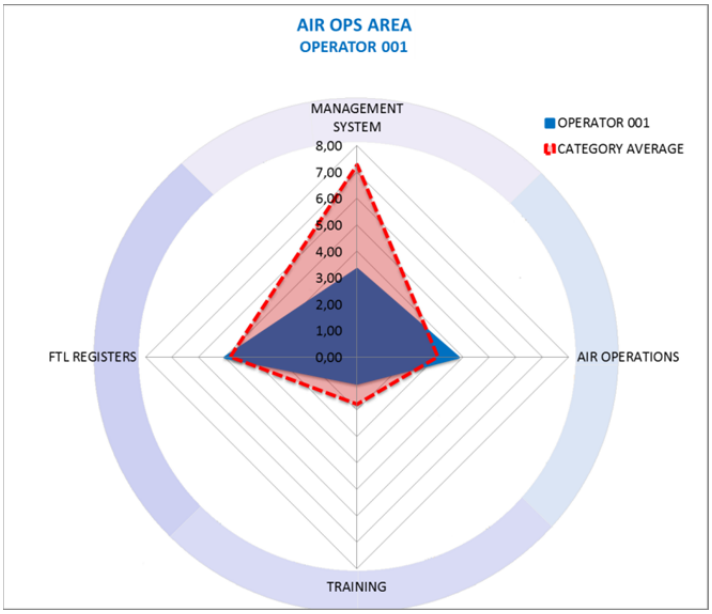
These audits and inspections are grouped into four domains:

- MANAGEMENT SYSTEM: A1, A2, A3
- AIR OPERATIONS: A4, A7, A8, A9, A10; I1, I2, I3a, I7, I8, I9
- TRAINING: A6a, A6b; I4, I5, I6a, I6b, I6c
- FTL REGISTERS: A5; I3b

4.8.2 REPRESENTATION OF THE FINDINGS IN EACH DOMAIN

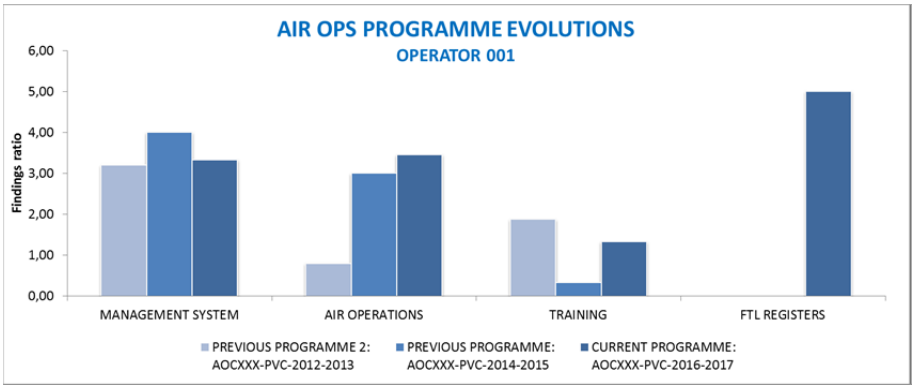
The value assigned for each domain is the ratio of findings per inspection or audit assigned to each domain.

The representation is a polygon of as many vertices as domain has been defined, whose area is limited by the values that take the different ratios for each domain; so the smaller the area is, the better the safety status in air operations is.



4.8.3 COMPARISON OF THE CURRENT AIR OPS PROGRAMME WITH THE PREVIOUS PROGRAMMES

The AIR OPS programme lasts for two years, and it shall analyse all the areas and domains described above. Other representation that shows the evolution of the operator is the one that compares the results of the current AIR OPS programme with the previous ones, in order to obtain certain evolutions or trends of the operator.



4.9 SANA-SAFA AREA

The purpose of this representation is to provide information of the ramp inspection activities included in the SAFA and the SANA programmes.

The inspections are focused on different elements that are used to plan and analyse the inspections within these programmes. This representation should:

- Show the monitoring results of the ramps inspections of an operator, through the ratio of findings in each element defined
- Compare the results of the operator with the average of all the operators in the same category.
- Highlight the elements where the operator or the category has more problems.

4.9.1 DEFINITION OF THE INSPECTION AREAS OF THE SAFA-SANA PROGRAMMES

Listed below are the inspection elements in which findings will be classified, and the domains the analysis is performed with.

DOMAIN	CODE	INSPECTION ELEMENT	DOMAIN	CODE	INSPECTION ELEMENT
AIRWORTHINESS - Flight deck	A01	General condition	AIRWORTHINESS - Aircraft condition	C01	General external condition
	A02	Emergency exit		C02	Doors and hatches
	A03	Equipment		C03	Flight controls
	A07	Minimum equipment list		C04	Wheels, tyres and brakes
	A08	Certificate of registration		C05	Undercarriages, skids/floats
	A09	Noise certification		C06	Wheel well
	A11	Radio license		C07	Powerplant and pylon
	A12	Certificate of airworthiness		C08	Fan blades, propellers, rotors
	A16	Life-jackets		C09	Obvious repairs
	A17	Harness		C10	Obvious unrepaired damage
	A18	Oxygen equipment		C11	Leakage
	A19	Independent portable light	AIRWORTHINESS - Cargo	D01	General condition of cargo compartment
	A22	Maintenance release	AIR OPERATIONS - Flight deck	A04	Manuals
	A23	Defect notification and rectification		A05	Checklist
	A24	Pre-flight inspection		A06	Navigation/instrument charts
AIRWORTHINESS - Cabin safety	B01	General internal condition		A10	AOC or equivalent
	B02	Cabin crew station and crew rest area		A13	Flight data preparation
	B03	First aid kit		A14	Mass and balance calculation
	B04	Hand fire extinguisers		A15	Hand fire extinguisers
	B05	Life-jackets		A20	Flight crew license/ composition
	B06	Seat belt and seat condition		A21	Journey log book or equivalent
	B07	Emergency exit, lighting and independent portable light	AIR OPERATIONS - Cabin safety	B11	Cabin crew members
	B08	Slides/life-rafts, ELT		B13	Stowage of passenger baggage
	B09	Oxygen supply		B14	Seat capacity
	B10	Safety instuctions	AIR OPERATIONS - Cargo	D02	Dangerous goods
	B12	Access to emergency exits		D03	Cargo stowage

So, the inspection domains defined for the analysis are:

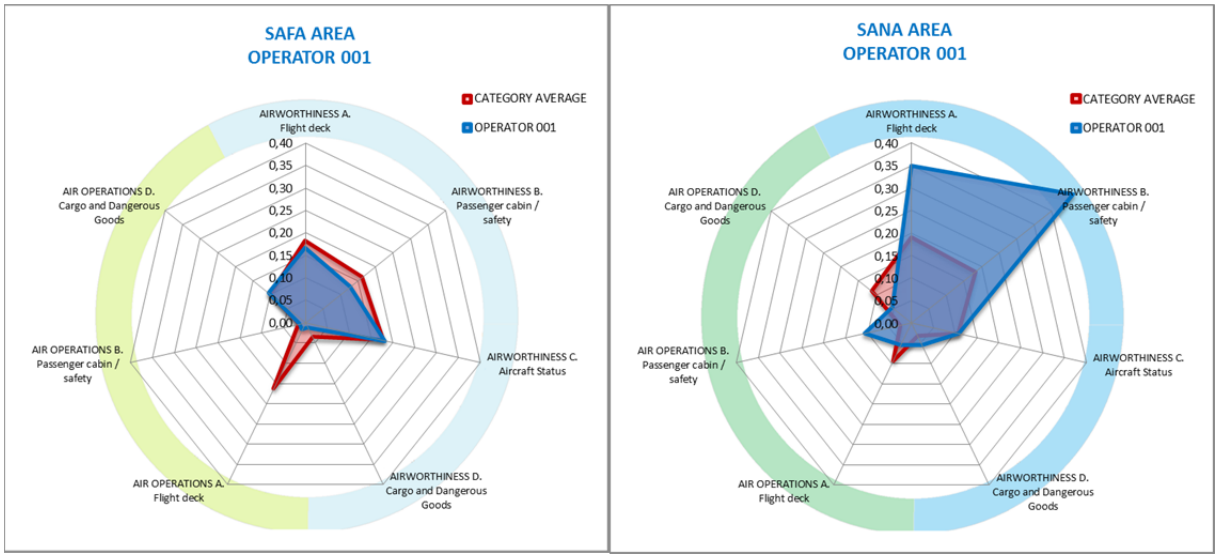
A. Airworthiness – Flight deck
B. Airworthiness – Cabin safety
C. Airworthiness – Aircraft status
D. Airworthiness – Cargo

A. Air operations - Flight deck
B. Air operations - Cabin safety
D. Air operations - Cargo

4.9.2 REPRESENTATION OF THE FINDINGS IN EACH INSPECTION DOMAIN

The value assigned for each inspection domain is the ratio of findings per inspection assigned to each inspection domain.

The representation is a polygon of as many vertices as inspection domain has been defined, whose area is limited by the values that take the different ratios for each inspection domain; so the smaller the area is, the better the safety status in the ramp inspections is.



4.10 OCCURRENCE AREA

In order to ensure a maximum level of harmonisation in the occurrence coding in ECCAIRS database, a standardized event coding protocol has been defined which merges the general guidelines provided by European organizations for the correct use and exploitation of the information of the occurrences.

Taking advantage of this coding protocol, the occurrences are classified and represented by occurrence rate according to their group, category and typology, with the aim of identifying trends or evolutions in operator occurrences that help the planning of inspections or show trends that may lead to a risk for its activity that needs to be assessed in greater depth. These representations must:

- Show the occurrence rate of the operator according to the group, category or typology.
- Compare the results of the operator with respect to the average of its category
- Highlight groups, categories or types of occurrences where there are problems at operator or category level.

4.10.1 DEFINITION OF THE OCCURRENCE GROUPS AND CATEGORIES

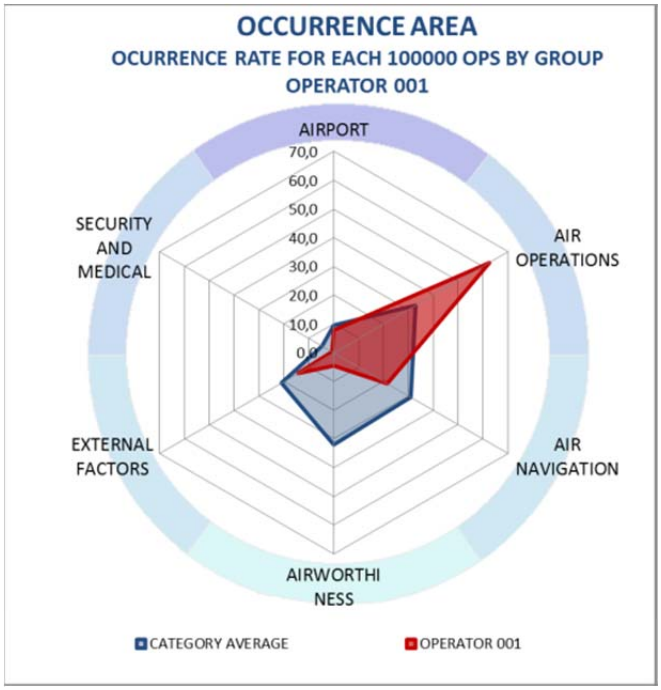
Listed below are the groups and categories in which the occurrences are classified in ECCAIRS and which are of interest for the analysis of CAT operators.

GROUP	CATEGORY
AIRPORT	HANDLING
	INFRAESTRUCTURE AND AIRPORT MANAGEMENT
	AIRCRAFT DAMAGE ON GROUND
	ANIMAL INCURSION
AIR OPERATIONS	SPECIAL AIRCRAFTS
	FLIGHT AND AIRCRAFT MANAGEMENT
	UNSTABILIZED APPROACH
	ABNORMAL RUNWAY CONTACT
	RUNWAY EXCURSION
	(CUASI) COLLISION AGAINST TERRAIN/OBSTACLES
	AERIAL WORKS
	LOSS OF CONTROL
AIR NAVIGATION SERVICES	SEPARATION LOSS AND TCAS
	RUNWAY INCURSION
	ATM/AIS SERVICES
	AIR NAVIGATION SERVICES
AIRWORTHINESS	FUEL
	FIRE/SMOKE
	AIRCRAFT SYSTEMS
	MAINTENANCE
	CABIN EQUIPMENT
SECURITY AND MEDICAL	SECURITY
	MEDICAL
EXTERNAL FACTORS	METEOROLOGICAL CONDITIONS
	BIRDS
	EXTERNAL CONDITIONS

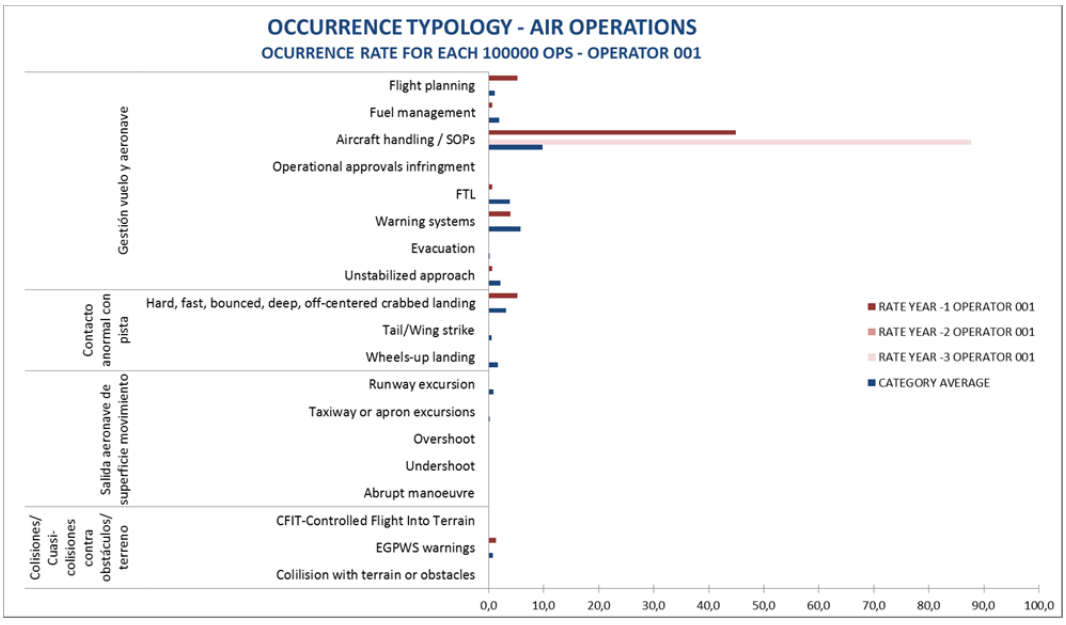
4.10.2 REPRESENTATION OF THE OCCURRENCES IN EACH GROUP AND CATEGORY

The value assigned for each group or category is the occurrence rate per 100,000 operations to each group or category.

The first representation is a polygon of as many vertices as occurrence groups has been defined, whose area is limited by the values that take the different occurrence rates for each group; so the smaller the area is, the better the safety status is.



Another representation is the occurrence rate according to the category within each group of occurrences. There will be different representations for each group. Operator evolutions can be compared between several time situations or the operator can be compared with the category average.



4.11 ECONOMIC AREA

The purpose of this representation is to provide information of the economic monitoring activities to the operators.

This representation should:

- Show the economic monitoring results of an operator, through the economic indexes used in the economic indicator
- Compare the results of the operator with the average of all the operators in the same category.
- Highlight the indexes where the operator or the category has more problems.

4.11.1 DEFINITION OF THE ECONOMIC INDEXES

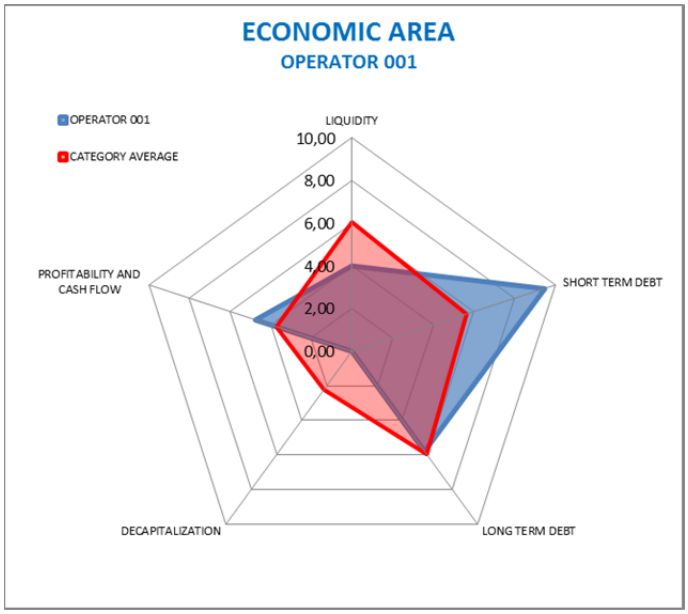
In the definition of the economic indicator the following economic indexes are defined. These indexes will take values from 0 to 10, and the greater its value is, the worse the economic situation of the operator in that area is. The indexes are:

- Liquidity: takes into account the liquidity ratio and the acid test
- Short-term debt: takes into account the short-term solvency ratio, the short-term debt ratio and the quality of the debt
- Long-term debt: takes into account the leverage ratio, the long-term debt ratio, the financial autonomy ratio and the financing ratio of non-current assets.
- Decapitalization: takes into account the yield of the dividend, the decapitalization for the group and the distribution of dividends
- Profitability and cash flows: takes into account operating margin, financial profitability, economic profitability and cash flows on assets

4.11.2 REPRESENTATION OF THE ECONOMIC INDEXES

The value assigned for each economic index is the result of the economic monitoring according the economic indicator definition.

The representation is a polygon of as many vertices as economic indexes has been defined, whose area is limited by the values that take the different indexes; so the smaller the area is, the better the economic status is.



5. APPENDIX 1 – ECONOMIC INDEXES

RISK FACTORS ASSOCIATED WITH INDEXES OF THE FINANCIAL STATEMENTS OF THE COMPANY (1/2)

For each Commercial Air Transport operator:

	INDEX	CALCULATION OF THE INDEX	Weighting	Threshold	Lower limit	Score over 10		Score over 100
						Conditions	$Score_{10.i.j}$	$Score_{100.i.j}$
I_1	**LIQUIDITY**	Index calculated as the weighting of the liquidity ratio (40%) and the acid test (60%)	P_1 =25%	-----	-----	-----	$Score_{10.1} = \sum_j (Score_{10.1.j} \times P_{1.j}) / P_1$	$Score_{100.1} = \sum_j (Score_{100.1.j})$
	Liquidity Ratio	$I_{1.1}$ =(Current assets – Stocks)/Current liabilities	$P_{1.1}$=10%	$S_{1.1}$=160 %	$L_{1.1}$=90%	If $I_{1.1} \geq S_{1.1}$	10	$Score_{10.1.1} \times P_{1.1}$
						If $L_{1.1} < I_{1.1} > S_{1.1}$	$10 \times (S_{1.1} - I_{1.1}) / (S_{1.1} - L_{1.1})$	
						If $I_{1.1} \leq L_{1.1}$	0	
	Acid Test	$I_{1.2}$=Treasury / Current liabilities	$P_{1.2}$=15%	$S_{1.2}$=20 %	$L_{1.2}$=10%	If $I_{1.2} \geq S_{1.2}$	10	$Score_{10.1.2} \times P_{1.2}$
						If $L_{1.2} < I_{1.2} > S_{1.2}$	$10 \times (S_{1.2} - I_{1.2}) / (S_{1.2} - L_{1.2})$	
						If $I_{1.2} \leq L_{1.2}$	0	
I_2	**SHORT-TERM DEBT**	Index calculated as the weighting of the short term solvency ratio (46.67%), the short term debt ratio (26.67 %) and the quality of the debt (26.67%)	P_2 =15%	-----	-----	-----	$Score_{10.2} = \sum_j (Score_{10.2.j} \times P_{2.j}) / P_2$	$Score_{100.2} = \sum_j (Score_{100.2.j})$
	Short-term solvency ratio	$I_{2.1}$= Current assets / Current liabilities	$P_{2.1}$=7%	$S_{2.1}$=160 %	$L_{2.1}$=100%	If $I_{2.1} \geq S_{2.1}$	10	$Score_{10.2.1} \times P_{2.1}$
						If $L_{2.1} < I_{2.1} > S_{2.1}$	$10 \times (S_{2.1} - I_{2.1}) / \lvert (S_{2.1} - L_{2.1}) \rvert$	
						If $I_{2.1} \leq L_{2.1}$	0	
	Short term debt ratio	$I_{2.2}$= Current liabilities / Equity and liabilities	$P_{2.2}$=4%	$S_{2.2}$=50%	$L_{2.2}$=30%	If $I_{2.1} \leq S_{2.1}$	10	$Score_{10.2.2} \times P_{2.2}$
						If $L_{2.1} < I_{2.1} > S_{2.1}$	$10 \times (S_{2.2} - I_{2.2}) / \lvert (S_{2.2} - L_{2.2}) \rvert$	
						If $I_{2.1} \geq L_{2.1}$	0	
	Quality of the debt;	$I_{2.3}$= Current liabilities / Total liabilities	$P_{2.3}$=4%	$S_{2.3}$=70%	$L_{2.3}$=10%	If $I_{2.1} \leq S_{2.1}$	10	$Score_{10.2.3} \times P_{2.3}$
						If $L_{2.1} < I_{2.1} > S_{2.1}$	$10 \times (S_{2.3} - I_{2.3}) / \lvert (S_{2.3} - L_{2.3}) \rvert$	
						If $I_{2.1} \geq L_{2.1}$	0	
I_3	**LONG TERM DEBT**	Index calculated as the weighting of the leverage ratio (20%), the long term debt ratio (20%), the financial autonomy ratio (20%) and the non-current assets funding coefficient (40%)	P_3 =15%	-----	-----	-----	$Score_{10.3} = \sum_j (Score_{10.3.j} \times P_{3.j}) / P_3$	$Score_{100.3} = \sum_j (Score_{100.3.j})$
$I_{3.1}$	Leverage ratio	Assets / Liabilities	$P_{3.1}$=3%	$S_{3.1}$=60%	$L_{3.1}$=10%	If $I_{3.1} \geq S_{3.1}$	10	$Score_{10.3.1} \times P_{3.1}$
						If $L_{3.1} < I_{3.1} > S_{3.1}$	$10 \times (S_{3.1} - I_{3.1}) / \lvert (S_{3.1} - L_{3.1}) \rvert$	
						If $I_{3.1} \leq L_{3.1}$	0	
$I_{3.2}$	Long term debt ratio	Non-current liabilities / Total assets and liabilities	$P_{3.2}$=3%	$S_{3.1}$=50%	$L_{3.2}$=20%	If $I_{3.2} \geq S_{3.2}$	10	$Score_{10.3.2} \times P_{3.2}$
						If $L_{3.2} < I_{3.2} > S_{3.2}$	$10 \times (S_{3.2} - I_{3.2}) / \lvert (S_{3.2} - L_{3.2}) \rvert$	
						If $I_{3.2} \geq L_{3.2}$	0	
$I_{3.3}$	Financial autonomy ratio	Assets / Total assets and liabilities	$P_{3.3}$=3%	$S_{3.2}$=200%	$L_{3.3}$=100%	If $I_{3.3} \geq S_{3.3}$	10	$Score_{10.3.3} \times P_{3.3}$
						If $L_{3.3} < I_{3.3} > S_{3.3}$	$10 \times (S_{3.3} - I_{3.3}) / \lvert (S_{3.3} - L_{3.3}) \rvert$	
						If $I_{3.3} \leq L_{3.3}$	0	
$I_{3.4}$	Non-current assets funding coefficient	(Total assets and liabilities + Non-current liabilities) / Non-current assets	$P_{3.4}$=6%	$S_{3.3}$=150%	$L_{3.4}$=100%	If $I_{3.4} \leq S_{3.4}$	10	$Score_{10.3.4} \times P_{3.4}$
						If $L_{3.4} < I_{3.4} > S_{3.4}$	$10 \times (S_{3.4} - I_{3.4}) / \lvert (S_{3.4} - L_{3.4}) \rvert$	
						If $I_{3.4} \geq L_{3.4}$	0	
I_4	**DECAPITALIZATION**	Index calculated as the weighting of the pay- out ratio (40%), the decapitalization for its business group (33.33%) and the distribution of dividends (26.67%)	P_4 =15%	-----	-----	-----	$Score_{10.4} = \sum_j (Score_{10.4.j} \times P_{4.j}) / P_4$	$Score_{100.4} = \sum_j (Score_{100.4.j})$
$I_{4.1}$	Pay-Out ratio	Dividends / Net income of the year	$P_{4.1}$=6%	$S_{4.1}$=2%	$L_{4.1}$=0%	If $I_{4.1} \leq S_{4.1}$	10	$Score_{10.4.1} \times P_{4.1}$
						If $L_{4.1} < I_{4.1} > S_{4.1}$	$10 \times (S_{4.1} - I_{4.1}) / \lvert (S_{4.1} - L_{4.1}) \rvert$	
						If $I_{4.1} \geq L_{4.1}$	0	
$I_{4.2}$	Decapitalization for its business group	Credits to group companies / Current assets	$P_{4.2}$=5%	$S_{4.2}$=5%	$L_{4.2}$=0%	If $I_{4.2} \leq S_{4.2}$	10	$Score_{10.4.2} \times P_{4.2}$
						If $L_{4.2} < I_{4.2} > S_{4.2}$	$10 \times (S_{4.2} - I_{4.2}) / \lvert (S_{4.2} - L_{4.2}) \rvert$	
						If $I_{4.2} \geq L_{4.2}$	0	
$I_{4.3}$	Distribution of dividends	Dividends / Assets	$P_{4.3}$=4%	$S_{4.3}$=2%	$L_{4.3}$=0%	If $I_{4.3} \leq S_{4.3}$	10	$Score_{10.4.3} \times P_{4.3}$
						If $L_{4.3} < I_{4.3} > S_{4.3}$	$10 \times (S_{4.3} - I_{4.3}) / \lvert (S_{4.3} - L_{4.3}) \rvert$	
						If $I_{4.3} \geq L_{4.3}$	0	
I_5	**PROFITABILITY AND CASH FLOW**	Index calculated as the weighting of the operating margin (26.67%), the return of equity (13.33%), the return of assets (10%) and the cash flow on assets (50%)	P_4 =30%	-----	-----	-----	$Score_{10.5} = \sum_j (Score_{10.5.j} \times P_{5.j}) / P_5$	$Score_{100.5} = \sum_j (Score_{100.5.j})$
$I_{5.1}$	Operating margin	Operational result / Billing	$P_{5.1}$=8%	$S_{5.1}$=5%	$L_{5.1}$=-2%	If $I_{5.1} \geq S_{5.1}$	10	$Score_{10.5.1} \times P_{5.1}$
						If $L_{5.1} < I_{5.1} > S_{5.1}$	$10 \times (S_{5.1} - I_{5.1}) / \lvert (S_{5.1} - L_{5.1}) \rvert$	
						If $I_{5.1} \leq L_{5.1}$	0	
$I_{5.2}$	Return of Equity	Net income of the year / Assets	$P_{5.2}$=4%	$S_{5.2}$=5%	$L_{5.2}$=-5%	If $I_{5.2} \geq S_{5.2}$	10	$Score_{10.5.2} \times P_{5.2}$
						If $L_{5.2} < I_{5.2} > S_{5.2}$	$10 \times (S_{5.2} - I_{5.2}) / \lvert (S_{5.2} - L_{5.2}) \rvert$	
						If $I_{5.2} \leq L_{5.2}$	0	
$I_{5.3}$	Return of Assets	Operational results/ Total assets	$P_{5.3}$=3%	$S_{5.3}$=5%	$L_{5.3}$=-2%	If $I_{5.3} \geq S_{5.3}$	10	$Score_{10.5.3} \times P_{5.3}$
						If $L_{5.3} < I_{5.3} > S_{5.3}$	$10 \times (S_{5.3} - I_{5.3}) / \lvert (S_{5.3} - L_{5.3}) \rvert$	
						If $I_{5.3} \leq L_{5.3}$	0	
$I_{5.4}$	Cash Flow on Assets	(Net income of the year ± Amortizations) / Total assets	$P_{5.4}$=15%	$S_{5.4}$=5%	$L_{5.4}$=0%	If $I_{5.4} \geq S_{5.4}$	10	$Score_{10.5.4} \times P_{5.4}$
						If $L_{5.4} < I_{5.4} > S_{5.4}$	$10 \times (S_{5.4} - I_{5.4}) / \lvert (S_{5.4} - L_{5.4}) \rvert$	
						If $I_{5.4} \leq L_{5.4}$	0	
I_{100}	**INDEX 100 (0-100)**	Index calculated as the weighting of the liquidity (25%), short-term debt (15%), long-term debt (15%), decapitalization (15%) and profitability and cash flow (30%) indexes.						$I_{100} = \sum_j (Score_{100.i})$

For all the category:

$I_{100sector}$	**INDEX 100 (0-100)**	Index calculated as the ponderation of the individual index 100 of each operator, is the average index 100 of the category	-----	-----	-----	-----	$I_{100category} = \sum_{operator} I_{100operator}$ / number operators	

RISK FACTORS ASSOCIATED WITH INDEXES OF THE FINANCIAL STATEMENTS OF THE COMPANY (2/2)

	INDEX	DESCRIPTION	SCORE
I_6	**COUPLING OF CRITICAL ECONOMIC FACTORS**	I. ***Restructuring of the company or changes in the business model*** Examples: ▪ Increasing or reduction of capital with or without modification of the structure of the company ▪ Declaration of competition of creditors ▪ Major fleet changes due to a major change in the business model ▪ Increasing or reduction of the fleet (without changing in the fleet models) II. ***Anomalous variations in the personnel and (or) labour tensions:*** Examples: ▪ Collective dismissal of the workers ▪ Workers adjustment plans ▪ Dismissals ▪ Disputing in the collective bargaining ▪ Strikes, etc. III. ***Opening or closing of routes*** IV. ***Financing of the company by Public Administrations or National or International Organisations*** Trough deferrals or non-payments of outstanding contributuions: ▪ Increasing in debt or non-payment of navigation fees to the ANS Authorities ▪ Increasing in debt or non-payment of navigation fees to the Airport Authorities ▪ Increasing in debt or non-payment to airport services providers ▪ Postponements accepted or not by the tax authorities ▪ Excessive development of debts with group companies V. ***Declaration of suspension of payments or competition of creditors*** VI. ***Very fast degradation of economic indexes (>50%)*** VII. ***Parameters contained within Order 8.9000.1 : "Flight Standards Information Management Systems (FSIMS)" of the FAA*** VIII. ***Others not identified in any of the elements of this list, but as criteria of the analyst should be taken into account for the evolution of the airline.***	**Index that can take the values 0,10 or 20, depending on whether the company fulfils certain circumstances** **(I to VIII) Score$_{100.6}$= 0 / 10 / 20**
I_7	**COMPARISON WITH THE CATEGORY**	Index that can take values between 0 and 10, depending on whether the company has an index 100 lower or higher than the category average.	If $I_{100,\ operator} > I_{100\ category}$ **I_7=10** If $I_{100,\ operator} \leq I_{100\ category}$ **I_7=0**
I_8	**COMPARISON WITH THE PREVIOUS ECONOMIC STATUS**	Index that can take values of 0, 10 and 20, depending on whether the company fulfils certain circumstances related to the evolution of the index 100, comparing with the previous trimester	If $(I_{100,\ operator,\ trimester\ n}) - (I_{100,\ operator,\ trimester(n-1)}) \geq 5$ **I_8=20** If $2 < (I_{100,\ operator,\ trimester\ n}) - (I_{100,\ operator,\ trimester(n-1)}) < 5$ **I_8=10** If $(I_{100,\ operator,\ trimester\ n}) - (I_{100,\ operator,\ trimester(n-1)}) < 2$ **I_8=0**

I_{150}	**INDEX 150 (0-150)**	Total economic risk index of the operator	$I_{150} = I_{100} + I_6 + I_7 + I_8$
i_{eco}	**ECONOMIC INDICATOR (0-5)**	Economic indicator for CAT methodology	$i_{eco} = \frac{I_{150} \cdot 5}{150}$

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