SMS Optimised Practice/Good Practice Submission			
ANSP	ENAIRE	Date of submission	Sept 2023
Contact Details	Email:	Tel:	

SoE Study Area	Fatigue and Stress Risk Management
OP/GP title	FSRMS Dashboard
In use since	2022
ANSPs using this practice	

Details:

ENAIRE decided to provide an integrated approach when dealing with fatigue and stress risks and their potential impact on operational safety. European regulation is providing a framework for human factors management which only includes fatigue and stress operational risks. However, regulation on stress management is limited in terms of fostering the deployment of CISM programmes as an activity to mitigate the effects of stress on ATCOs

Due to the physiological and psychological dimensions of both fatigue and stress, they share some common human processes, triggers or contributing/influence factors and they may induce similar effects on humans. In fact, many of the reports already investigated, ENAIRE has identified problems in the self-discrimination of stress or fatigue events. This has led to the development of an integrated approach where an ATCO may report stress, fatigue or combined events, and provide further data to identify after an investigation whether the reported event may correspond to fatigue (which can be physiological, emotional, mental or perceptual), stress (acute, critical, persistent) or both.

Even though Spain's national regulations specify operational activity limits and rostering acceptability rules, due to the fact that fatigue is subject to other factors of operational and personal nature, fatigue events may still occur. Detection of reports, segmenting by ATS units and providing information about the event and contributing factors is essential to identify the key information. Besides, our approach allows integrating information about those safety occurrences where fatigue or stress has been a contributing factor of the safety occurrence, or conversely, where a safety occurrence may result in a fatigue or stress event. Fatigue and stress can be assessed as isolated safety events unrelated to any other event, a contributing factor to events or a consecuence of safety events, and the impact on risk strongly differs in their essence.

ENAIRE's integrated approach allows the common reporting of both fatigue and stress events, investigate them under a common fatigue and stress model and generate a structured set of fatigue and stress data that can be exploited. All fatigue and stress reports are recorded within our FSRMS common inventory, and this is exploited by using an FSRMS Dashboard developed on an escalable PowerBI report, also useful as a tool to extract data for recurrent reports production. This integration also allows to optimize the processing of all types of reports and the generation of documents. Our taxonomy contains a multilayered set of contributing factors, where importance is given to high level factors groupings (themes) which provides a very accurate picture of what kind of factors are the relevant ones.

Many of the fatigue and stress reports do not only refer to actual events, but also to latent risks, which are seldom reported using other reporting processes, or whose detection may be difficult at safety surveys due to lack of ATCO participation. On the contrary, the FSRSM reporting system complements periodic safety surveys acting also as a continuous safety survey, where latent risks are also identified. In addition to this, the information provides highly valuable information about the contextual factors at ATS units to understand some of the safety issues identified there. The dashboard may also serve as a tool to measure the effectiveness of action plans to mitigate fatigue and stress risks previously identified by assessing the impact on reporting levels and their associated severity.

The development of the FSRMS inventory took about a year to reach our current maturity level, but its initial versions could be developed by one person in about 1 month for the database and up to two weeks to have the first dashboard version. The database and dashboard architecture were designed following an open approach, which allowed ENAIRE to have an incremental development of both. The dashboard is continuously evolving using previous functionalities and reducing development costs. However, our current version is based on a much more advanced knowledge, is based on a proprietary fatigue and stress integrated model focused on assessing the impact on human performance (and hence, on safety), and makes use of a specific contributing factors taxonomy and structure, and is already able to assess the severity of the fatigue or stress event by estimating the exposure to fatigue and stress risk and how it might have affected human performance in relation to safe operations. Current needs require a person to maintain and develop the inventory and another person part time to develop new functionalities as required. However, the core resources are provided by investigators, and in this case our team has 4 investigators plus the head of the department supervising the investigations.

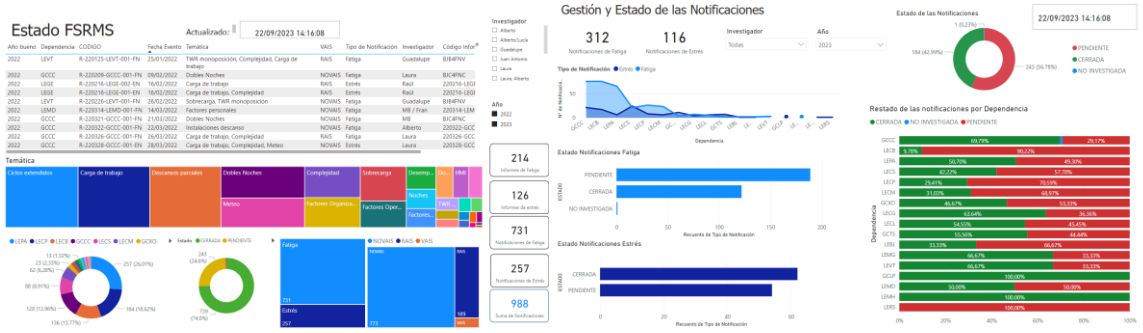
This safety management process was developed due to regulatory requirements but being integrated within the safety management system benefits from common shared information and lessons. On the other hand, fatigue and stress reports, let's be honest, are the usual suspects of not being true, or be an instrument for internal labor pressure. Fatigue and stress are by definition private events, only felt by the reporters, and it is normally neither possible to demonstrate either its existence nor demonstrate their absence. ENAIRE's approach towards investigations is focused on assessing the consistence of what is reported with factors known by current scientific knowledge that correlate with stress and fatigue. Therefore, what is shown on the Dashboards has been already assessed by human factors investigators. Using this scientific-based approach helps in increasing the cultural aspects of fatigue and stress reports as credible reports. This has also had a benefit in terms of safety culture and reporting culture, since the ATCOs community has been able to see that their reports have been investigated, taken into account, and safety actions have been initiated.

After more than one year using the Dashboard, there is a number of direct safety benefits we have been able to do things like the following:

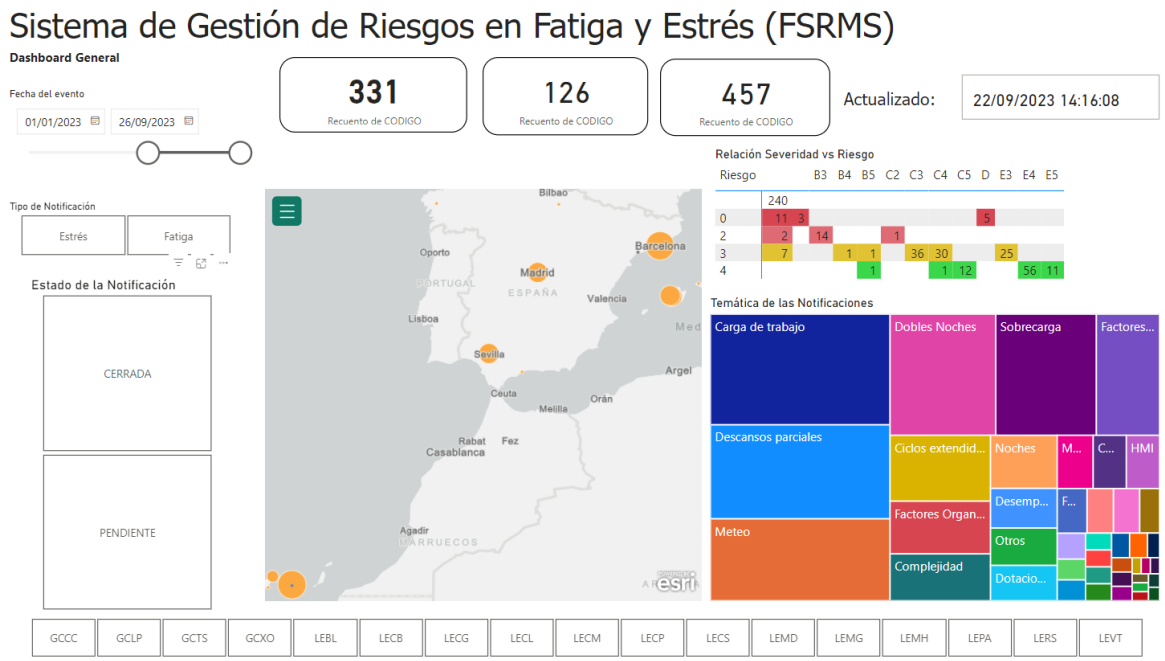
- Contributing to safety argumentations to foster safety plans at specific ATS units affected by strong VFR aviation schools activity.
- Becoming the standard reporting method to report sector overloads and technical occurrences that lead to stress events.
- Identify cases where current regulation in terms of activity time was not being fully followed, and where operations were planned to comply with regulations marginally and being vulnerable to any unforeseen event or circumstance.
- Be able to measure the evolution of overloads, and identify the key sectors where these occur. This also helped in assessing the actual level of safety of recent changes (occupancy-based flow control at some ATS units)
- Assess the levels of fatigue and stress by naturalistic language analysis and how its structure evolves along time
- Support the decision-making process related to rostering schemes (limiting the 6-2 scheme)
- Identify why some units may be overreporting; in one case the dashboard helped in identifying easily that the ATCOs main chronotype was a vespertine one, and most of the reports where filed on morning shifts, thus revealing a source of risk increasing the probability and intensity of fatigue in that specific subset.
- Identify the real effect on ATCOs of specific critical situations (Chinese rocket re-entry, strong fires at an island, etc)
- The effect of heat waves on increasing ATCO fatigue reporting
- The identification of high stress levels on ATCOs also having a management function, allowing us to deploy a specific stress reduction programme for them
- As an essential tool to manage the investigation team and prioritizing investigations

The benefit of the dashboard as it is relies on the ease of use and the reduction of analysis and assessment times due to its versatility. The dashboard is shared via an online report with all safety management relevant staff. Segmentation is extremely powerful in order to assess and perform an in-depth analysis. Segmentation can be done by dates, day of the week, theme, contributing factors, open/closed investigations, ATS unit, fatigue/stress/combined reports, their relation to other safety occurrences, assigned risk level. In addition to this, having a quick view can also help in identifying wrong reported data and some reporting patterns showing problems in understanding the report questions (leading to fine tuning the incorrect wording). Some screenshots are shown below.

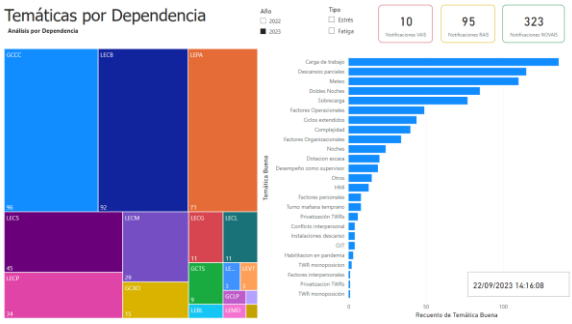
The following reports are used to track the status of reports, and have a quick view of the report types, ATS units and the status of investigated or pending reports by type.



The following screen provides a general overview of the number of reports, associated risk, segmenting by date, investigation status and main themes.



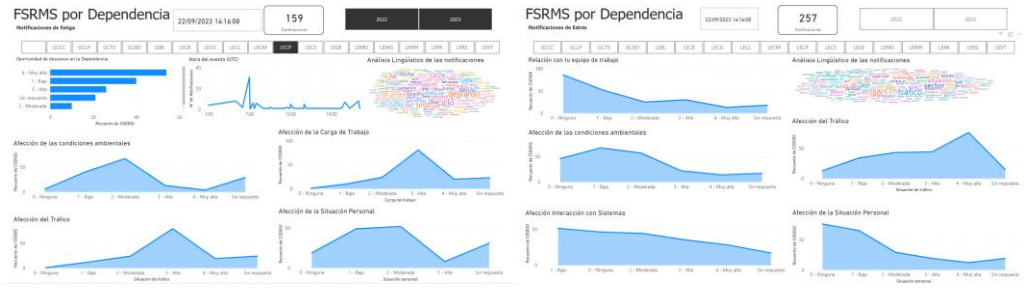
The following screens are used to assess the report themes and how they relate to other safety events. In blue proactive reports are shown, yellow shows fatigue and stress reports caused by other safety occurrence, and red ones are themes related to fatigue/stress events being a contributing factor of another safety occurrence. This information can be segmented by year, ATS unit…



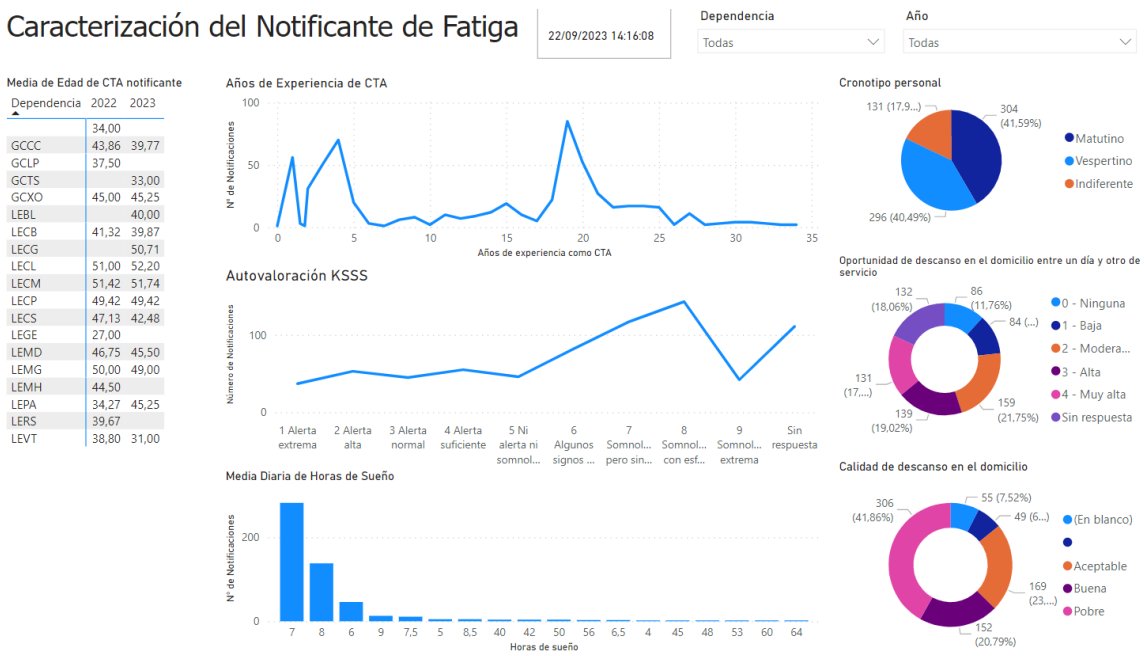
The following screen show a temporal evolution of reports, where the correlation time of year – fatigue reports (light blue) show the importance of workload on reporting and the stability of stress reports. Information can be also segmented by risk levels on the right hand bars, and themes can also be used for assessments.

The following screens show how the ATS units behave in terms of reporting content. It allows to measure the importance of different factors on reporters perception of their impact on fatigue. Time of day related to the fatigue

event is also included, along with a word cloud that allows to have a general picture of the most frequent relevant terms used in the text description.



The following screen allows to assess the main characteristics of the fatigue reporter. Parameters like the average age, how many years has the reporter has worked as an ATCO, chronotype, sleep average time and sleep quality factors.



By submitting this document, your organisation is willing for the proposed Optimised or Good Practice to be shared with other ANSPs.

For Optimised Practices, this document should be sent together with the SoE in SMS questionnaire, to: soe_2021@eurocontrol.int **by 31st July 2021 at the latest**.

Submissions for consideration as Good Practices may be sent by the above date. They may also be identified during the survey interview sessions with the survey team, following which a Good Practice submission document will be requested.