

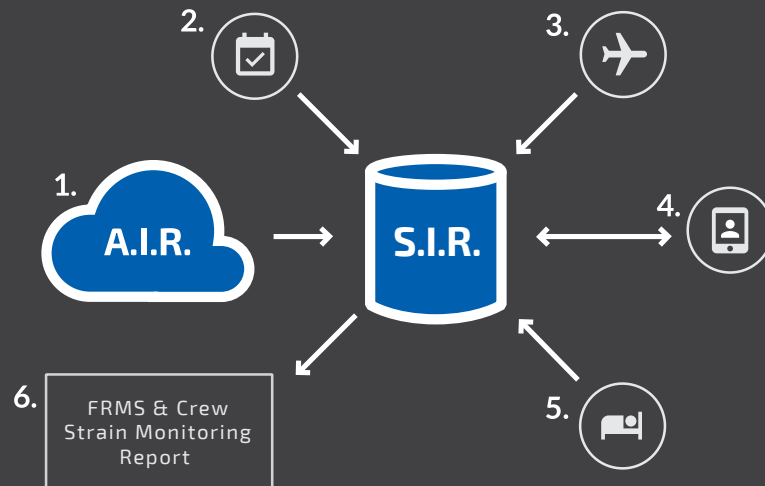
Fatigue risk & crew strain monitoring

Every flight operation is subject to intrinsic and extrinsic triggered crew fatigue and strain. Resilience, monitoring and organizational measures are key to preventing those scenarios from becoming a hazard. To measure fatigue a dedicated mobile app lets crew members report their experienced fatigue in different flight phases and offers a test for objective fatigue-related performance through a psychomotor vigilance task. avialytics' multivariate approach to Fatigue Risk and Crew Strain utilizes and combines a variety of objective and individual information sources to monitor and measure strain parameters and supports decision making in crew planning and flight safety departments. It thereby minimizes negative effects on operations. Furthermore, it provides a repository to improve and balance the effects of inevitable strain and fatigue.

Benefits:

- App-based subjective fatigue reporting and objective vigilance testing
- Comprehensive visual overview through standard and operator-specific fatigue and strain indicators
- Integration of organizational, bio-mathematical and individual fatigue and strain measures
- Different scope and granularity of information to be utilized for crew planning and flight safety
- Customizable component of an Electronic Flight Bag (EFB)
- Ability to capture experienced crew member fatigue in less than a minute

FRMS & Crew Strain Monitoring



Throughout the FRMS & Crew Strain Monitoring process, data from various sources like the avialytics' airline information Repository (A.I.R) and the avialytics' Fatigue Capture APP is collected and enriched. Bio-mathematical fatigue calculations are validated and

calibrated with the fatigue experienced and captured by the crew member. For further analytics this data can be anonymized and transferred into a Safety Information Repository (S.I.R) to be evaluated in the context of Flight Data Monitoring data.

How it Works

1. Operational data from Crew Planning and Flight Ops is transferred into avialytics' Safety Information Repository (SIR) for reference. (OPS perspective)
2. (Pseudo-) anonymized crew information (rotation, training, On-Off duty, bio-mathematical fatigue calculation, roster robustness, etc.) is provided as additional input (CREW perspective)
3. Real-time information (delays, diversions, WX, etc.) is used to supplement the data in the SIR.
4. Crews interact with the system through the Fatigue Capture App which allows them to report their experienced fatigue on and offline for all their flight operations. The system can be configured to show or hide the bio-mathematical values for the particular flight. It can optionally be used for a customizable full scale fatigue report. A psychomotor vigilance task (PVT) feature is available to objectively measure fatigue related performance. (Figure 1,2)
5. Actual crew rest and functions performed (pilot flying / pilot monitoring) are integrated to capture a detailed analysis.
6. A summarized big picture is calculated and visualized in avialytics' dynamic FRMS & Crew Strain Monitoring Report.



Figure 1: A psychomotor vigilance test can be performed by a crew member at any time before, during or after the flight operation. The outcome will be used to celebrate reported subjective fatigue and bio-mathematically calculated fatigue levels.

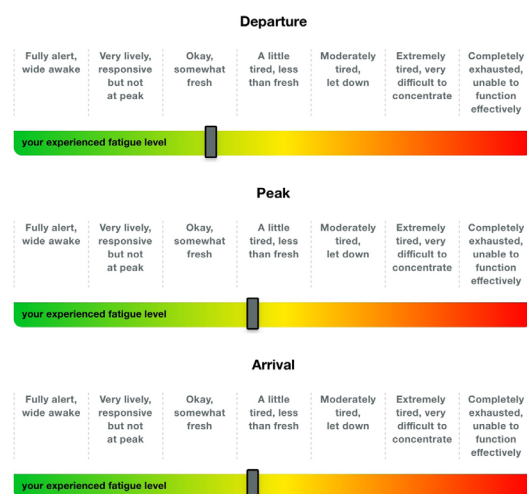
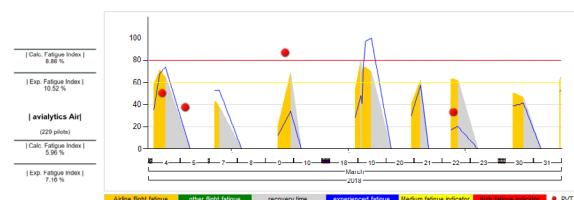


Figure 2: Fatigue Capture App. Sliding scale ranges from "Fully alert, wide awake" to "Completely exhausted" (Samn-Perelli based). Any "between" values can be selected as well.

FRMS & Crew Strain Monitoring Reports

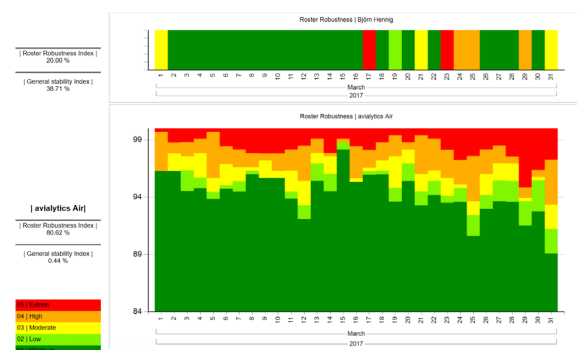
Fatigue Evaluation

The monthly duty roster of a crew member is presented through its bio-mathematical fatigue values. Individually experienced fatigue patterns, captured through the App as well as the outcome of PVTs are overlaid to display discrepancies.



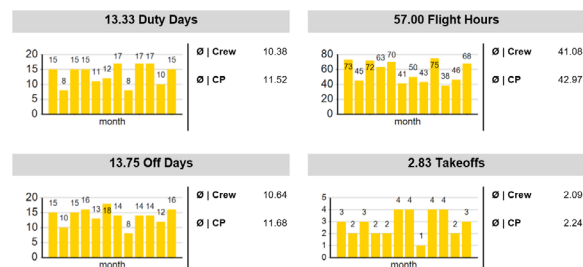
Roster Robustness

Compare the published roster with the duty actually executed by a crew member. Changes or disturbances are rated using a risk assessment approach based on the A.I.R. matrix definition: Occurrence prior departure (timeliness)



Performance Indicators

Performance Indicators and airline-specific indicators for a selected crew member are compared to overall company values and crews in the same function. Various chart types can be used for the different indicators to generate a meaningful overview.



Severity (by category)					Timeliness (hours ahead of STD)					
Time-zones	Recovery hours	Block hours	WOCL (min.)	Duty type	168 +	48 - 167	24 - 47	12 - 23	6 - 11	< 6
> +4	< -4	> +8	> +120	VAC → Flight OFF → Flight						
+4	-4	+8	+61 to +120							
+3	-3	+6 or +7	+31 to +60							
+2	-2	+4 or +5	+15 to +30	STBY → Flight						
+1	-1	+1 to +3	< +15							

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