

Roads to Fatigue Management



Fadiga na Aviação
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Topics

- History of Provisions
 - Past
 - Present
- What is FRMS?
- Why we need FRMS Standards
- *The Annex 6 FRMS Amendment*
 - *Fundamentals of an FRMS Implementation*
 - *SMS VS FRMS in Crew Scheduling.*
- ...and now what?



Why is fatigue a safety concern?

- Associated with performance declines
 - Less vigilant
 - Increasingly variable but overall slower reaction times
 - Forgetfulness
 - Inattention
 - Apathy
 - Irritability
 - Poor decision-making
 - Diminished communication
 - Slow processing, tunnel vision
 - Less creative problem solving
 - Non-reactive - ASLEEP



Evolution of FTLs

- 1999, ICAO identified further work required on FTL provisions;
 - Annex 6 contained a “description of factors”,
 - ICAO had no other guidance to assist States or Operators.
- 2000, ANC re-establishes the OPS Panel & adds to the work programme;
 - Limits for flight time, flight duty periods and rest periods.

Provisions of Annex 6

What was the problem?



- Requirement for States to establish regulations specifying the limitations on;
 - flight time,
 - flight duty periods, and
 - rest periods for flight crew members and cabin crew.
- What were the drawbacks?
 - Limits not necessarily scientifically obtained,
 - The responsibility remained with the State,
 - Focus on what is Legal rather than what is Safe.

Original OPSP TASK

- Review available information relating to objective fatigue indices for flight crew and cabin crew, and develop proposals for Annex 6 SARP and guidance material concerning limits for flight time, flight duty periods and rest periods for flight crew and cabin crew members.

OPSP – Step one

- Review and update the prescriptive Annex 6 provisions, where the main points were;
 - Obtaining values through science and knowledge; (consideration of sleep, circadian factors and operational characteristics),
 - Sharing of responsibility with the Operator,
 - Fatigue management concept introduced, and
 - Detailed guidance in Attachment “A”.
- Expand on a performance-based approach to address the “*one size does not fit all*”.

Annex 6 SARPs

The Prescriptive Road



- In essence no change to current SARPs;
 - Editorial to accommodate the FRMS option,
 - Integrates Flight and Cabin Crew Fatigue Management into one section.
- The State establishes the FTL limitations;
- The Operator manages the fatigue within the prescribed FTLs.

The Responsibility to Manage Fatigue

The State



4.10.1 The State of the Operator shall establish regulations for the purpose of managing fatigue. These regulations shall be based upon scientific principles and knowledge, with the aim of ensuring that flight and cabin crew members are performing at an adequate level of alertness. Accordingly, the State of the Operator shall establish: ...

*4.10.1 replaces 9.6 and 12.5

The Responsibility to Manage Fatigue

The Operator



4.10.2 The State of the Operator shall require that the operator, in compliance with 4.10.1 and for the purposes of managing its fatigue-related safety risks, establish either:

a) flight time, flight duty period, duty period and rest period limitation that are within the prescriptive fatigue management regulations established by the State of the Operator; or ...

*4.10.2 replaces 4.2.11.2

Who is Responsible?



**There is a shared responsibility between
the State, Operator and Crewmember**



“One Size does not fit all”



- Reach out beyond Panel constraints and form FRMS Task Force to incorporate;
 - Scientific community,
 - Regulators,
 - Operators, and
 - Stakeholders.
- FRMSTF was formed in August, 2009,
 - Web meetings and teleconferences,
 - First and only meeting, November 2009.

The Task

- Build upon the Ops Panel's previous work.
- Specify the implementation of a non-prescriptive approach.
- For application to:
 - Annex 6, Part 1 Operators: International Commercial Air Transport – Aeroplanes
 - Flight crew and cabin crew
- Provide guidance so that States can oversee, and operators can use, FRMS.

What is FRMS?

FRMS - Fatigue Risk Management System

A data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles and knowledge, that

ensures relevant personnel are performing at adequate levels of alertness.

What is FRMS?

Definition

A data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles and knowledge as well as operational experience, that ensures relevant personnel are performing at adequate levels of alertness.

What does FRMS mean?

- Enhanced safety and increased operational flexibility
 - Operator-identified FTLs
 - Specific to operational context
 - Continually evaluated and updated
- Oversight requires assessment of whether an equivalent level of safety is provided

FRMS Objectives?

A continuous process of planning, monitoring and managing the level of alertness of flight and cabin crew when performing their duties.

- Aims to manage fatigue irrespective of the cause,
- Based on science and empirical findings,
- Is data driven,
- Requires a systematic, organizational approach.

What are the scientific principles?

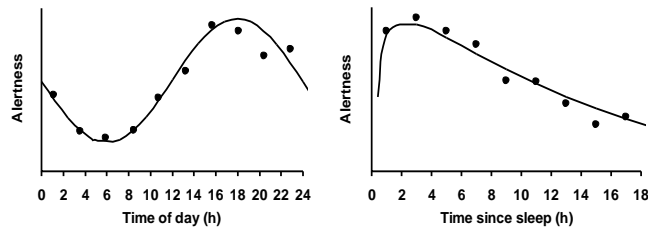
- Circadian biological clock
 - Cyclic susceptibility to sleep
 - Cyclic performance
- Sleep not rest:
 - Quantity
 - Quality
- Recovery
 - Transient
 - Cumulative
- Task related factors
 - Type
 - Duration
 - Environmental conditions

FRMS Data Collection



Prediction

Lab Data



In-Flight Data



Math Modeling



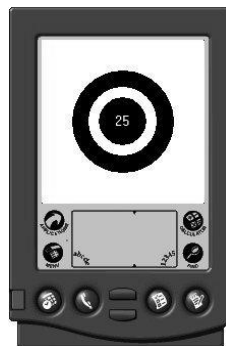
Schedules

Monitoring



Actigraphy

+



PVT/Log

+



Flight Data Monitoring



Validate/
Adjust
Schedules

Why do we need FRMS SARP?

- Improve safety outcomes;
- Provide global access to the benefits of FRMS;
- Identify common minimum standards;
- Facilitate the implementation of FRMS;
- Facilitate the appropriate oversight of FRMSs.

The FRMS Package

- All SARPs related to fatigue management together.
 - Prescriptive FTLs (as current)
 - FRMS
- FRMS Guidance
 - Operator's Manual
 - Regulator's Manual



Guidance Material

FRMS Manual for Operators:

1. Explains the minimum requirements in the Appendix.
2. Describes how to implement an FRMS.
3. Provides operational examples of various means of compliance.

FRMS Manual for Regulators:

1. Explains the intent of the SARPs.
2. Explains the minimum requirements in the Appendix.
3. Discusses the approval process and oversight of FRMS.

SARPs - Two Options for States

✈ Basic Requirements:

- The State of the Operator shall establish regulations for the purpose of managing fatigue.
- These regulations shall be based upon scientific principles and knowledge, with the aim of ensuring that flight and cabin crew members are performing at an adequate level of alertness.

✈ **Mandatory Prescriptive Regulations**

✈ **Optional FRMS Regulations**

SARPs - Three Options for Operators

- ✈ The State shall require that the operator establish:
 - Operations with prescriptive regulations

With State FRMS Regulations

- An FRMS for all operations
- An FRMS for some operations (e.g. ULR) and prescriptive regulations for the remainder of the operations

- An FRMS is optional for States.
- FRMS, if established in a State, is optional for Operators.

An approved FRMS shall provide at least a level of safety equivalent to, or better than, prescriptive limitations.

SARPs cont.

- ➔ Variations to FTLs on the basis of a risk assessment.
- ➔ FRMS processes must be functioning before approval can be given by State.
- ➔ Outer parameters to be identified.
- ➔ Recommendation: Integration with SMS.
- ➔ Maintain records of flight and duty periods.

Appendix

- Provides clear minimum requirements for an FRMS.
- Highlights consistencies between FRMS and SMS:
 - Both have a safety function;
 - Build upon existing processes.

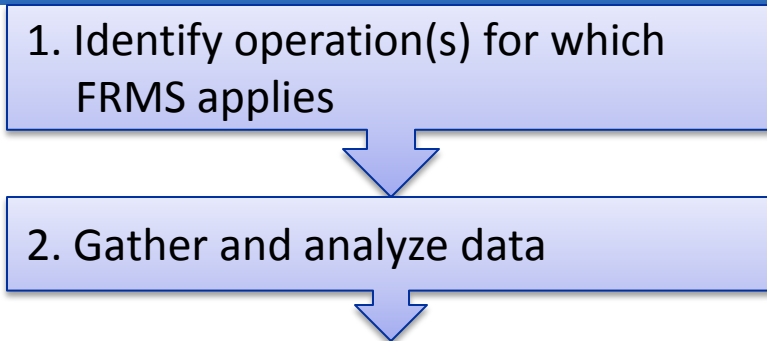
The FRMS Road: The Process

1. Identify operation(s) for which
FRMS applies

A large blue arrow pointing downwards, indicating the flow from the first step to the subsequent points.

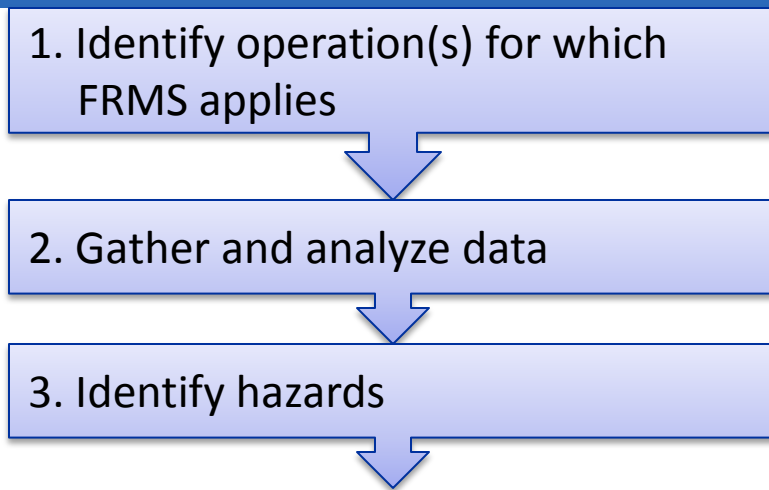
- Different operations have different causes for fatigue
 - ULR
 - short haul
 - night flights
- Different mitigations may be necessary

The FRMS Process



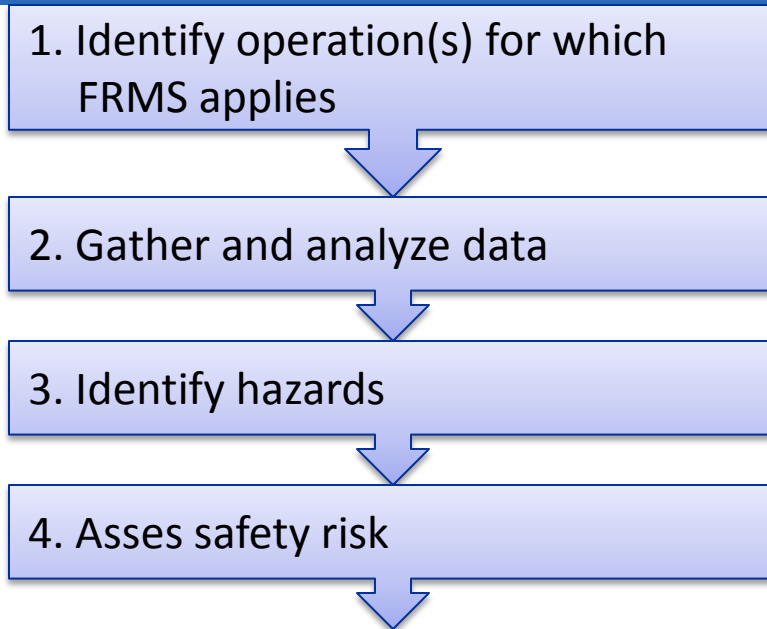
- Collect and analyze data
- Identify potential fatigue hazards
- Evaluate how it applies to the operation
- Gather more data

The FRMS Process



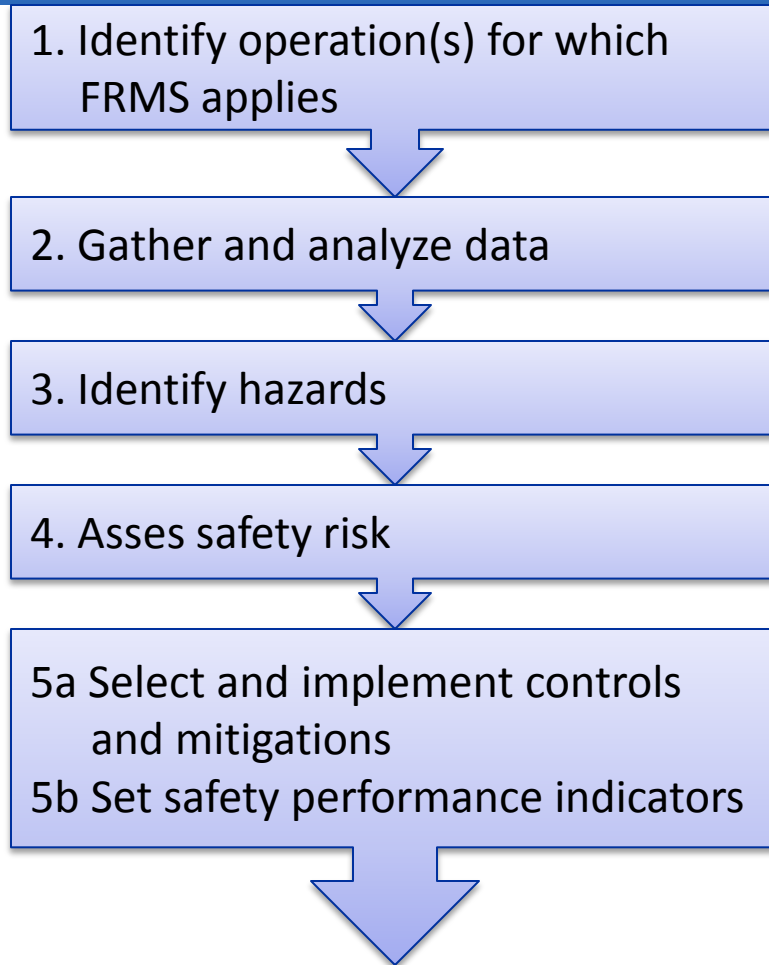
- Identify specific nature of fatigue hazards

The FRMS Process



- Conduct safety risk assessment for each hazard
- Determine which risk may be mitigated

The FRMS Process



- Implement mitigation strategies
 - Communicate
- SPIs assess level of risk reduction
 - Alarm levels

The FRMS Process



- Mitigations

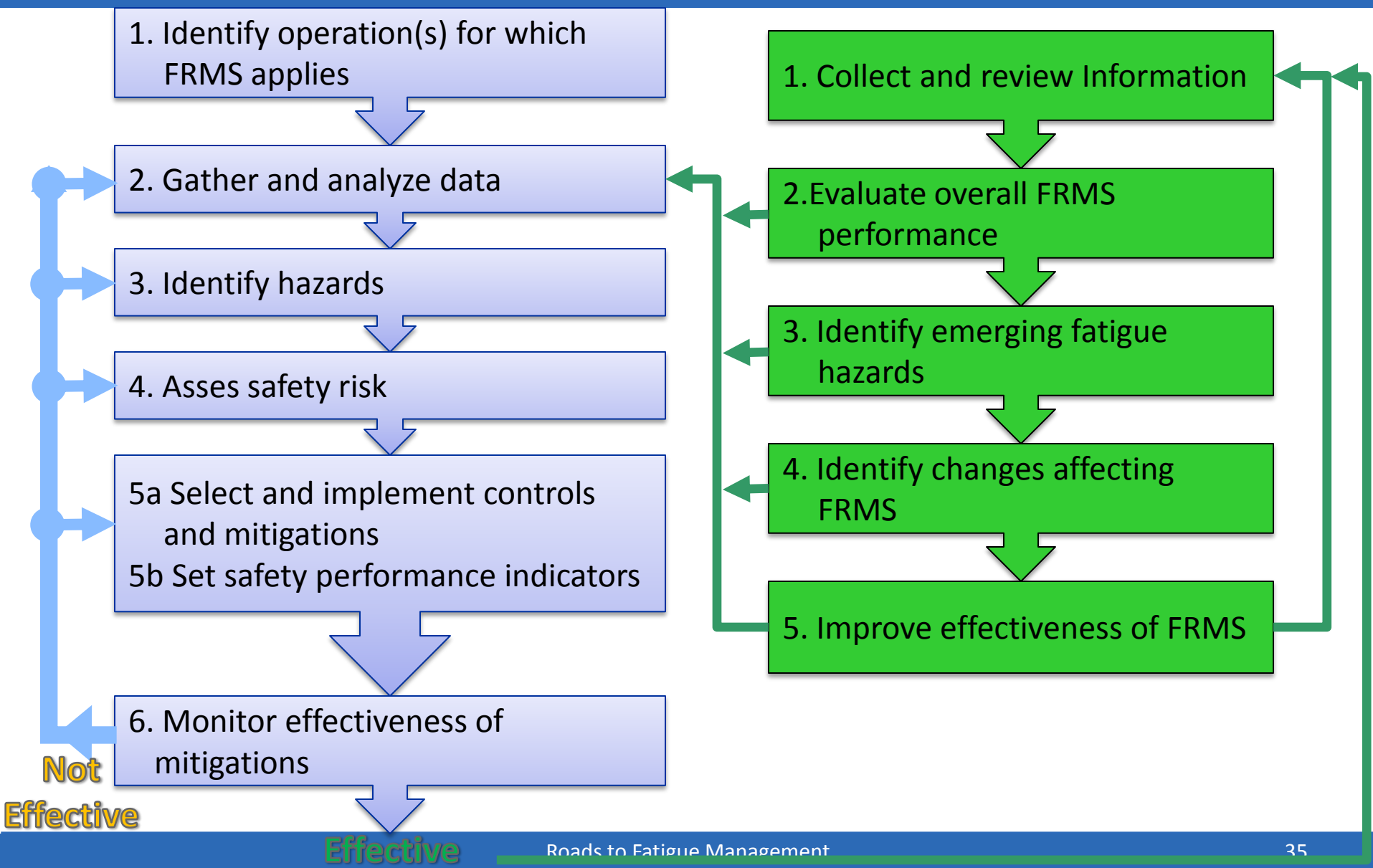
- Acceptable

- Become part of normal operations
 - Monitored by safety assurance

- Unacceptable

- Adjust process at appropriate step

The Safety Assurance Process



The Safety Assurance Example



FRMS Performance Indicator – Use of Captain's Discretion

1. Collect and review Information

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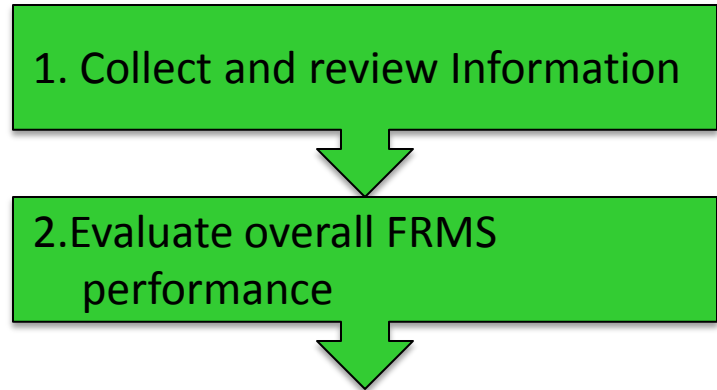
- Normal duty time has been established at 12hrs
 - Captain has discretion to expand it up to 13hrs.
- Crew scheduling plans trips with up to 11:20 of duty time
 - 40 min buffer.
- Use of captain's discretion recorded in the Logbook and analyzed monthly

The Safety Assurance Example



FRMS Performance Indicator – Use of Captain's Discretion

- Performance objective indicators
 - 11:45 alert levels
 - measure accuracy of planning
 - Captain's discretion – 10% of flights in 3 consecutive months is considered acceptable.
- A given rotation has an average of 12% occurrences of captain's discretion

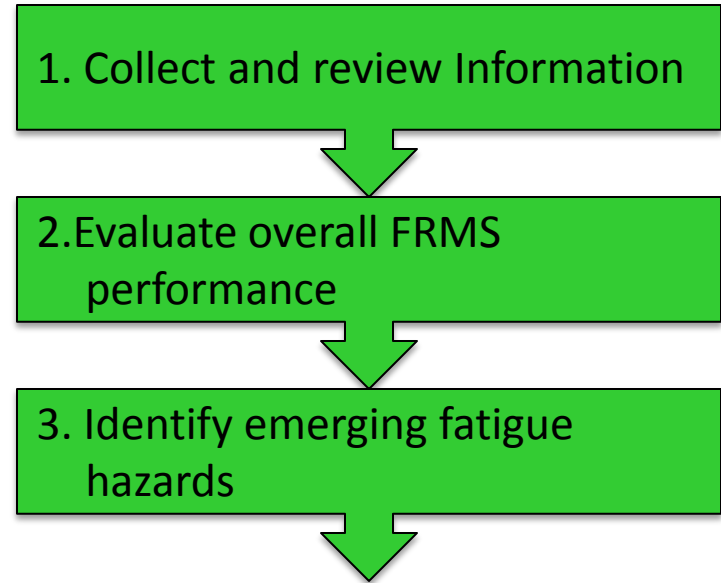


The Safety Assurance Example



FRMS Performance Indicator – Use of Captain's Discretion

- Causal factors identify:
 - Air traffic control
 - Ground handling
 - Especially of late passengers to the gate
- Schedule Planning, Dispatch and Ground Operations are notified.
- They had not previously identified the issue.

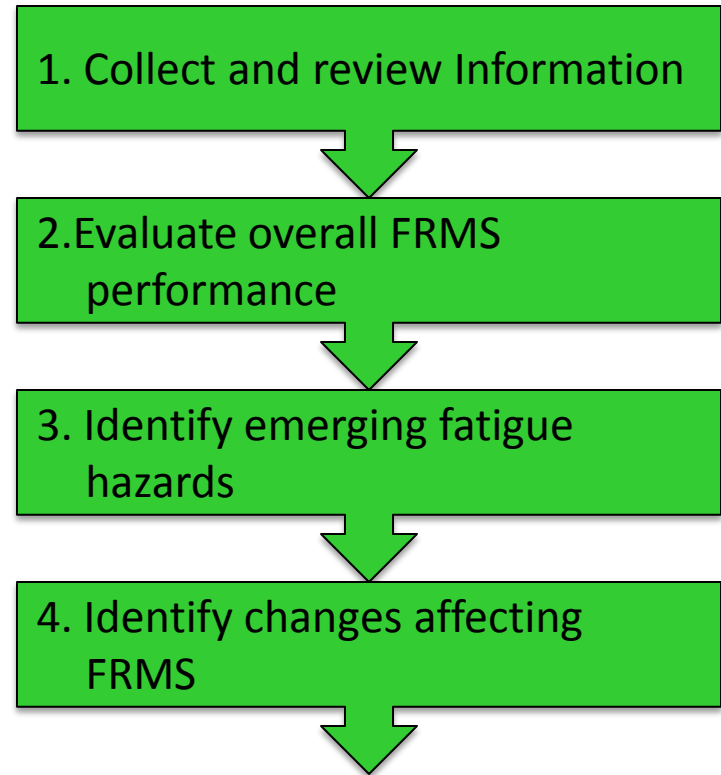


The Safety Assurance Example



FRMS Performance Indicator – Use of Captain's Discretion

- Not applicable

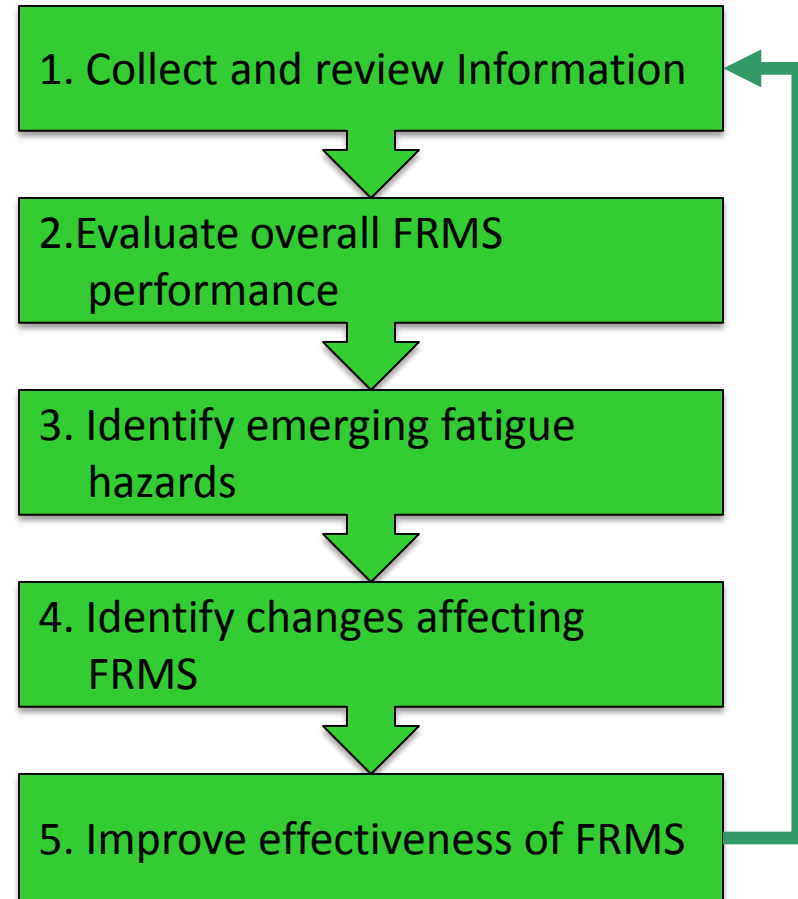


The Safety Assurance Example

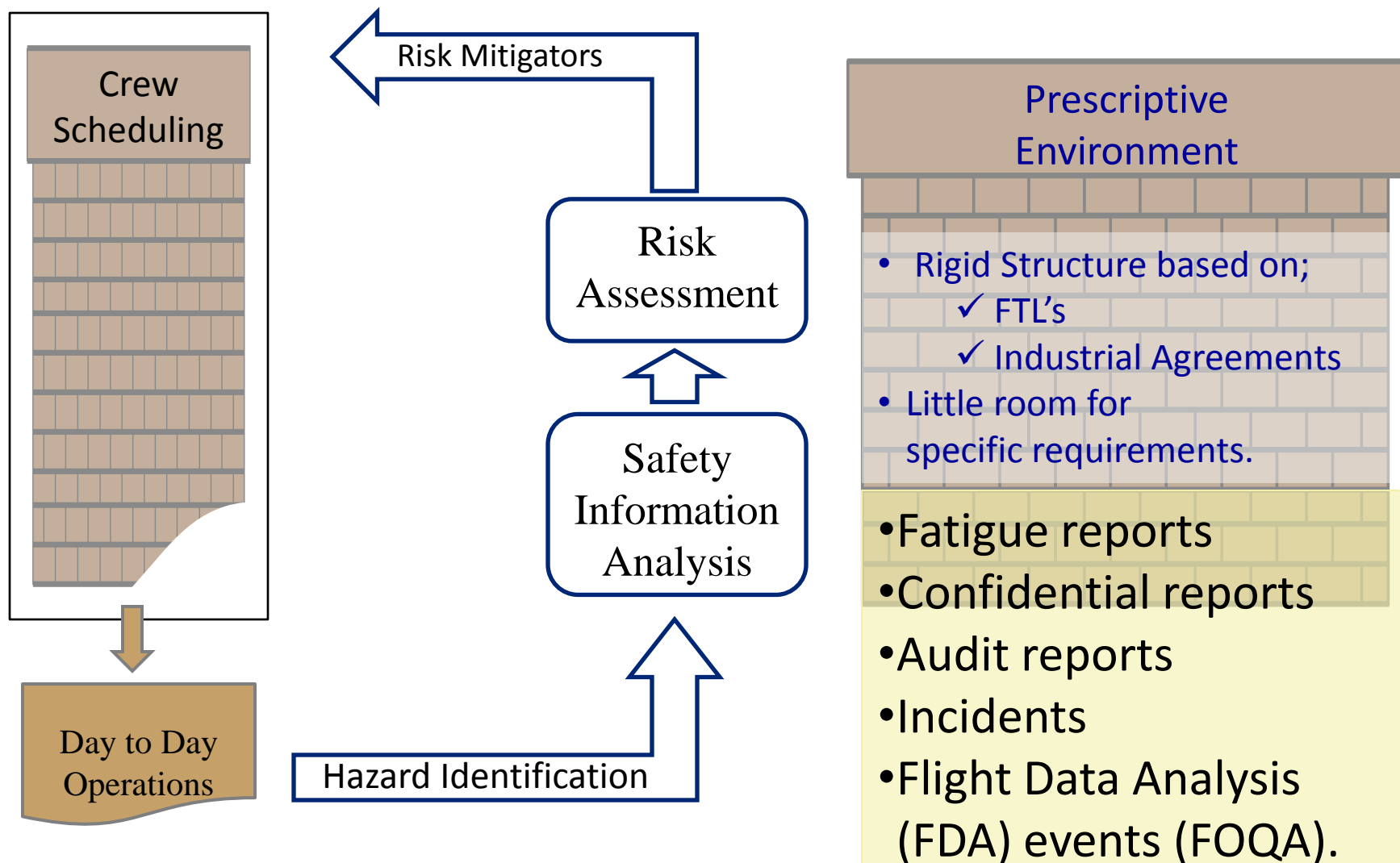


FRMS Performance Indicator – Use of Captain's Discretion

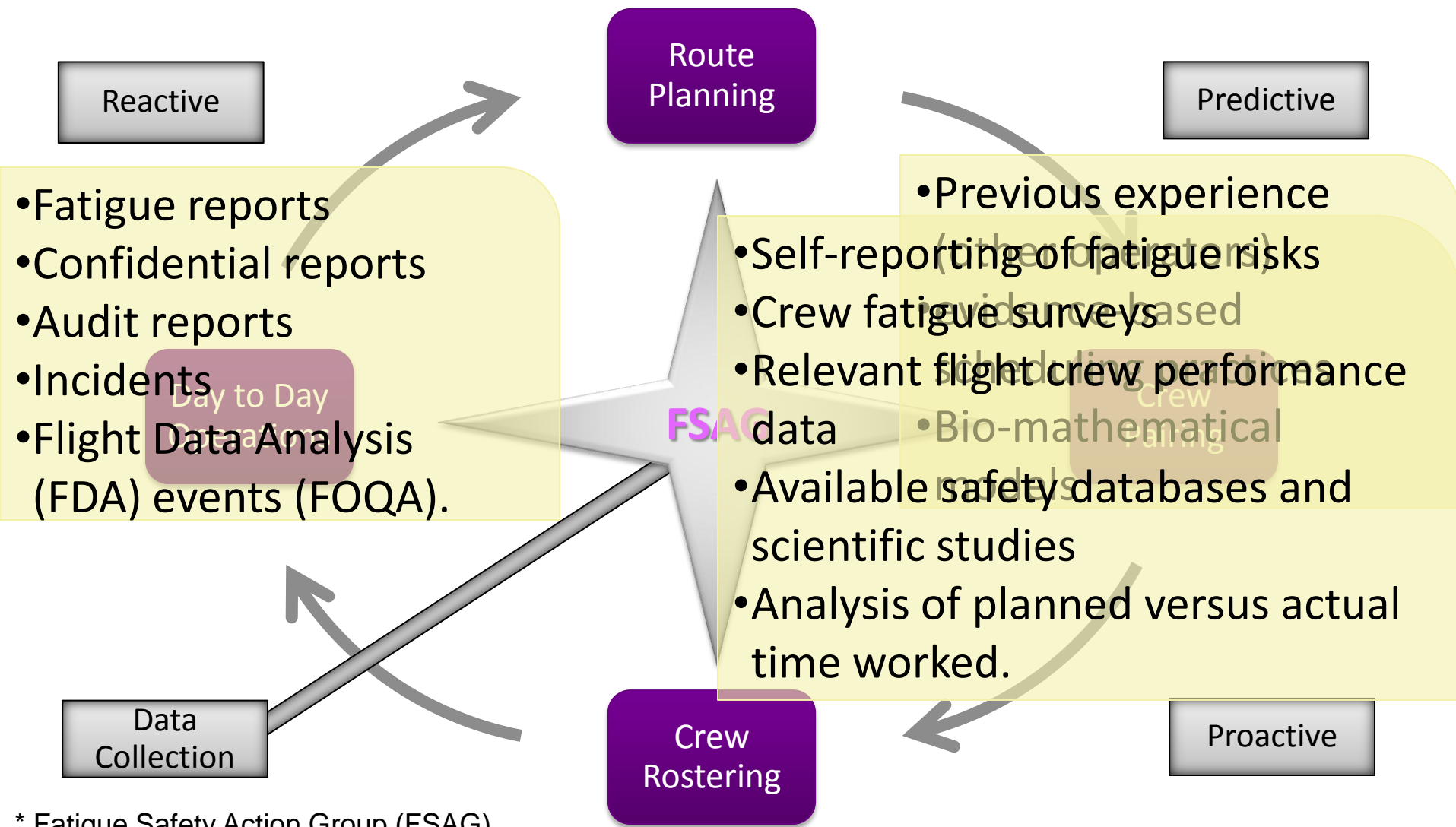
- Modifications
 - Planners modify departure time by 5 min
 - Flight dispatchers modify flight plan
 - Airport managers negotiate a new Service Level Agreement
- Results
 - Turnaround times improve
 - Average duty period on rotation is reduced
- Captain's discretion returns to acceptable region.



SMS in a FTL Environment



Crew Scheduling with FRMS



* Fatigue Safety Action Group (FSAG)

Fatigue Safety Action Group



SMS



Policy

- Identifies FRMS elements
- Identifies FRMS operations (scope)
- Reflects shared responsibility
- States safety objectives
- Declares management commitment
- Identifies lines of accountability

Documentation

- Policy and objectives
- Processes and procedures
- Accountabilities, responsibilities and authorities
- Mechanism for involvement of all stakeholders
- FRMS training records
- Planned and actual times worked
- Outputs (findings, recommendations, actions)

Risk Management Processes

- Identification of fatigue hazards
- Risk assessment
- Risk mitigation strategies

Safety Assurance Processes

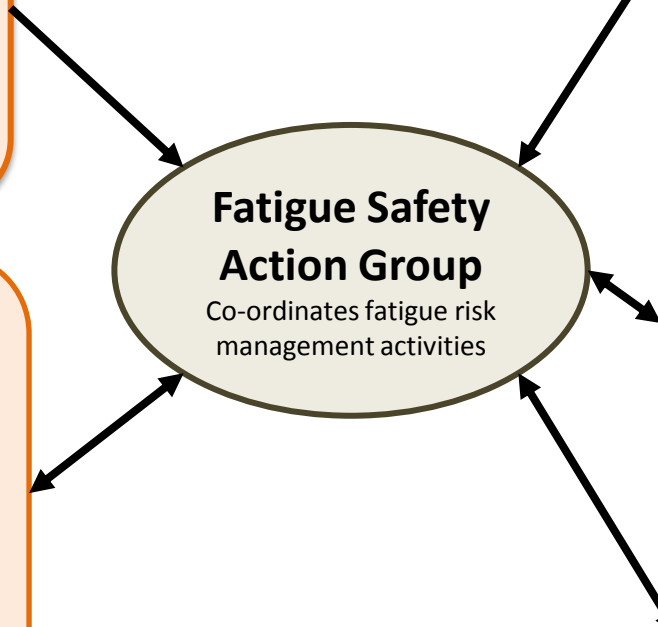
- Monitoring of FRMS performance
- Managing organizational & operational changes
- Continuous improvement

Promotion Processes

- Training program
- Communication plan

Fatigue Safety Action Group

Co-ordinates fatigue risk management activities



The SMS / FRMS Relationship

SMS Framework	FRMS
1. Safety policy and objectives	1. FRMS Policy and Documentation
2. Safety risk management	2. Fatigue risk management processes <ul style="list-style-type: none"> • Identification of hazards; • Risk assessment • Risk mitigation
3. Safety assurance	3. FRMS safety assurance processes <ul style="list-style-type: none"> • Monitoring effectiveness of FRM processes • Processes for managing changes to the operational environment, within the organisation, or to the FRMS itself. • Examination of available tools. • Continuous improvement of the FRMS
4. Safety promotion	4. FRMS promotion processes <ul style="list-style-type: none"> • Training programmes • FRMS communication plan

State Oversight

- An operator's FRMS shall be subject to safety assurance processes:
 - Values modifiable by regulator;
 - Demonstration of functioning processes to adequately meet fatigue management targets;
 - Data to demonstrate that personnel are performing at adequate levels of alertness.

What are we trying to achieve?

To provide standards and guidance which:

- Improve ability to manage fatigue risk;
- Apply current scientific knowledge and tools plus industry best practice;
- Are based on joint industry-government consensus;
- Identify various operationally viable methods;
- Assure appropriate regulatory oversight;
- Enhance global harmonization in their use.

Summary



Previous Provisions

- Regulate FTL, set limitations,
- “Create a Suit”



Prescriptive Provisions (Current)

- Guidelines, Scientific Principals,
- Shared responsibility,
- Better “Suit”, but one size does not fit all.



Performance-based Provisions (Future)

- Options for FRMS,
- Create different “Suits” for different operations.

What happens now?

- As of now: Preliminary review of proposed FRMS SARPs completed and accepted.

Received and considered States responses to proposal.

Accepted at final review by ANC.

- July 2011: Adoption by Council?
- Oct 2011: Effective date.
- Dec 2011: Applicable date.



Where to after that?

- Annex 6 Parts II, General Aviation
- Annex 6 Parts III, Helicopters
- ATC's
- Maintenance....

How do you find out more?



30 August – 2 September 2011

www.icao.int/FRMS2011

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