

A Risk-based Approach to Fatigue Management – a pathway to complying with OH&S legislation



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Seminar Overview

1. OH&S Legislative framework
2. Defining fatigue in operational settings
3. Causes and consequences of fatigue
4. Risk-based fatigue management
5. FAID® fatigue assessment software
6. Aviation Case Study

Legislative Framework

- OHS&W legislation sets out a general duty of care for employers to provide and maintain a safe and healthy work place. Legislation in all states and territories follows this formulation with the duty of care qualified by an expression such as "so far as is practicable".
- Modern OHS&W law is described as performance-based, highlighting the achievement of safety outcomes rather than defining in great detail the way in which the outcome is to be achieved.

Legislative Framework

- Risk-based Fatigue Management is designed within this framework to enable flexibility and innovation in managing workplace hazards pertaining to hours-of-work.

What is fatigue?

- Fatigue is a *state of impairment* that can trigger undesirable safety outcomes
- Fatigue can be experienced as having *physical*/muscular effects and/or *mental*/psychological effects
- Fatigue can be contributed to by both work & non-work factors; particularly those factors that reduce opportunity for, or achievement of, *recovery sleep*

What is fatigue?

- Fatigue can be *acute* and accumulate after a short period on a demanding task
- Acute fatigue can be managed operationally by using breaks within a shift (with appropriate regularity and length to also allow personal needs to be met)

What is fatigue?

- Fatigue can be *chronic* - not to be confused with the medically-defined Chronic Fatigue Syndrome - and accumulate over successive shifts
- Chronic fatigue can be managed operationally by ensuring that breaks between shifts allow adequate opportunity for recovery sleep [note: employees have a complementary responsibility to use time off to ensure they achieve adequate recovery sleep]

Causes of fatigue

- Work-related factors include:
 - *Inadequate sleep opportunity between shifts*
[note: especially critical for night and early morning shifts, and blocks of them]
 - *Inadequate rest opportunity within shifts*
[note: the requirement for breaks is dependent on the specific task demands, environmental conditions, experience of employee, etc.]
[note: more breaks and longer breaks are not necessarily the ideal for maintaining certain tasks]
 - *Work-related stressors* that might impact on employees' ability to otherwise maintain awareness of procedures, threats, etc.

Causes of fatigue

- Non-work factors include:
 - *Commute time/distance and conditions*
 - *Sleep or other medical disorders (or medications) that impact on sleep or alertness*
[note: this could include jet-lag symptoms, which could be work- or non-work-related]
 - *Nutrition, hydration, and general fitness*
 - *Non-work stressors* that might impact on employees' ability to otherwise maintain awareness of procedures, threats, etc.

Consequences of fatigue

Mood ↓ Communication ↓ Speed ↓ Accuracy ↓ Micro-sleeps ↑



**Fully
rested**

**Highly
fatigued**

- Focus of attention can be narrowed/tunneled
- Integration of information - even if routine in nature - can become degraded then stopped
- The ability to self-assess whether safety and/or productivity can be maintained is impaired

Risk-based Fatigue Management

- *The management of fatigue in a way that is appropriate for:*
 - *the level and pattern of risk exposure*
 - *the nature of the operation**in order to mitigate unacceptable effects of fatigue on the safety and productivity of the operation*

Risk-based Fatigue Management

- *As generally applied in Australia:
A scientifically-based, data-driven,
flexible alternative to prescriptive
hours of work regulation and forms
part of an organisations Safety
Management System*

FRM: As previously applied

- *Modular, poor integration of elements*



Risk-based *integrated* FRM

- *Each element informs / adds to others*



Faid®Safe



Risk Protection Level		FaidSafe® Modules
Primary Protection		FaidSafe® Diagnostic
		FaidSafe® Fatigue Hazard Analysis
		FaidSafe® Team Workshops
		FaidSafe® Systems Design Workforce Capacity Planning & Fatigue Safe Roster Design
		FaidSafe® Policies Fatigue Safe Policy & Procedures
Secondary Protection		FaidSafe® - Competency & Compliance Management Training & Education
		FaidSafe® - Competency & Compliance Workforce Training & Education
		FaidSafe® - Competency & Compliance Business Wide Compliance Monitoring
Tertiary Protection		FaidSafe® - Contingency & Emergency Plans
		FaidSafe®- Incident & Accident Investigation & Reporting
		Fatigue Graid® - Risk Grading Service Periodic assessment of fatigue risk controls

12 modules focused on the development of primary, secondary and tertiary fatigue protection

Based on the rigorous processes of Risk Engineering

Faid®Safe: Example modules

- **Hours of work diagnostic** using FAID®: to better understand the impact of hours of work on sleep opportunity, and also better understand the impacts on hours of work because of seasonality, staffing levels, overtime, etc.
- **Fatigue Hazard Analysis Workshops** using selected employees to map out tasks, key exposures, current countermeasures, and other available countermeasures/solutions



Faid®Safe: Example modules

- Assessment of current and possible exposures and protections using **GRAID®**: and insurance-standard tools
- Development or updating of relevant policy and procedures related to fatigue, fitness for duty and/or safety management
- Co-development and/or implementation of training and education programs for employees and managers/supervisors in conjunction with Humantra RTO



Fatigue Graid®

- Information
- User Guide
- Graid Scorecard
- New Analysis

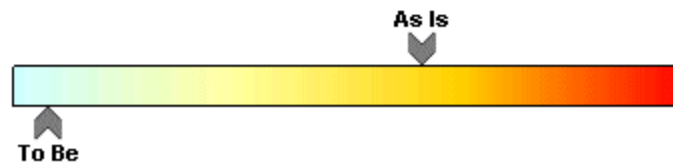


er Level **idZRE Professional**



Importance As Is To Be

Category	Sub-category	Description	Importance	Rating	
				As Is	To Be
Exposures	Hazards	Fatigue hazards associated with the operational environment	XH	C	C
		Driving to / from work	H	C	C
		Sleeping conditions	M	C	B
	Hours of Work	Hours of operations (i.e. day / afternoon / night operations)	XH	B	B
		Nature of work schedules (i.e. rotating, fixed, on-demand, stand ...)	L	B	B
	Capacity	Seasonality impacts on workload vs workforce balance	H	B	B
		Seasonality impacts on workforce profile	M	A	A
	Culture	Pay incentives which encourage personal fatigue	H	A	A
		Prevalence of second jobs	M	A	A
		Cultural expectations which encourage longer than planned hou...	M	C	B
Cultural issues that lead to less than normal sleep hours		M	B	B	
Workforce turnover		L	B	B	
		Sleeping Disorders	L	A	A
Safeguards	Primary	Work schedule design	H	B	A
		Hours of work risk assessment	H	C	A
		Fatigue hazard analysis methodology	H	C	A
		Fatigue Tolerance Level (FTL)	M	B	A
		Workforce capacity planning	M	C	B
		Fatigue safe policies and procedures	L	B	A
		Communication and consultation frameworks	L	C	A
	Secondary	Competency and awareness	H	C	A
		Compliance with corporate legislative fatigue safety standard	M	C	A
	Tertiary	Contingency and emergency procedures	H	B	A
		Incident and accident reporting	M	A	A
		Audit - periodic assessment of fatigue risk controls	M	B	A

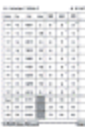


Potential Rating Excellent

Current Rating Fair

Current Score 116

Potential Score 12



F A I D

- Estimates of work-related fatigue are based on statistical modelling of the amount of sleep likely to be obtained by individuals based on the time of day and duration of work and non-work periods over a 7 day period.
- Indicative fatigue is inferred from estimated sleep obtained.
- These estimates are based on formulae developed by the Centre For Sleep Research at the University of South Australia and published in international peer review journals.



- FAID® scores are indicators only of the impact of sleep deprivation
- As they are based on a statistical analysis of research performed into fatigue levels over a broad sample of our population, they only provide guidance on the fatigue of an individual



Levels of Work-Related Fatigue Scores

- Standard fatigue represents fatigue scores up to the maximum fatigue scores produced for a Monday to Friday 0900 to 1700hr standard work week; that is, a score of 40.
- Moderate fatigue scores would be for the same work week, only work hours are from 2300 to 0700hr. Result is a score of ~ 80 .

FAID

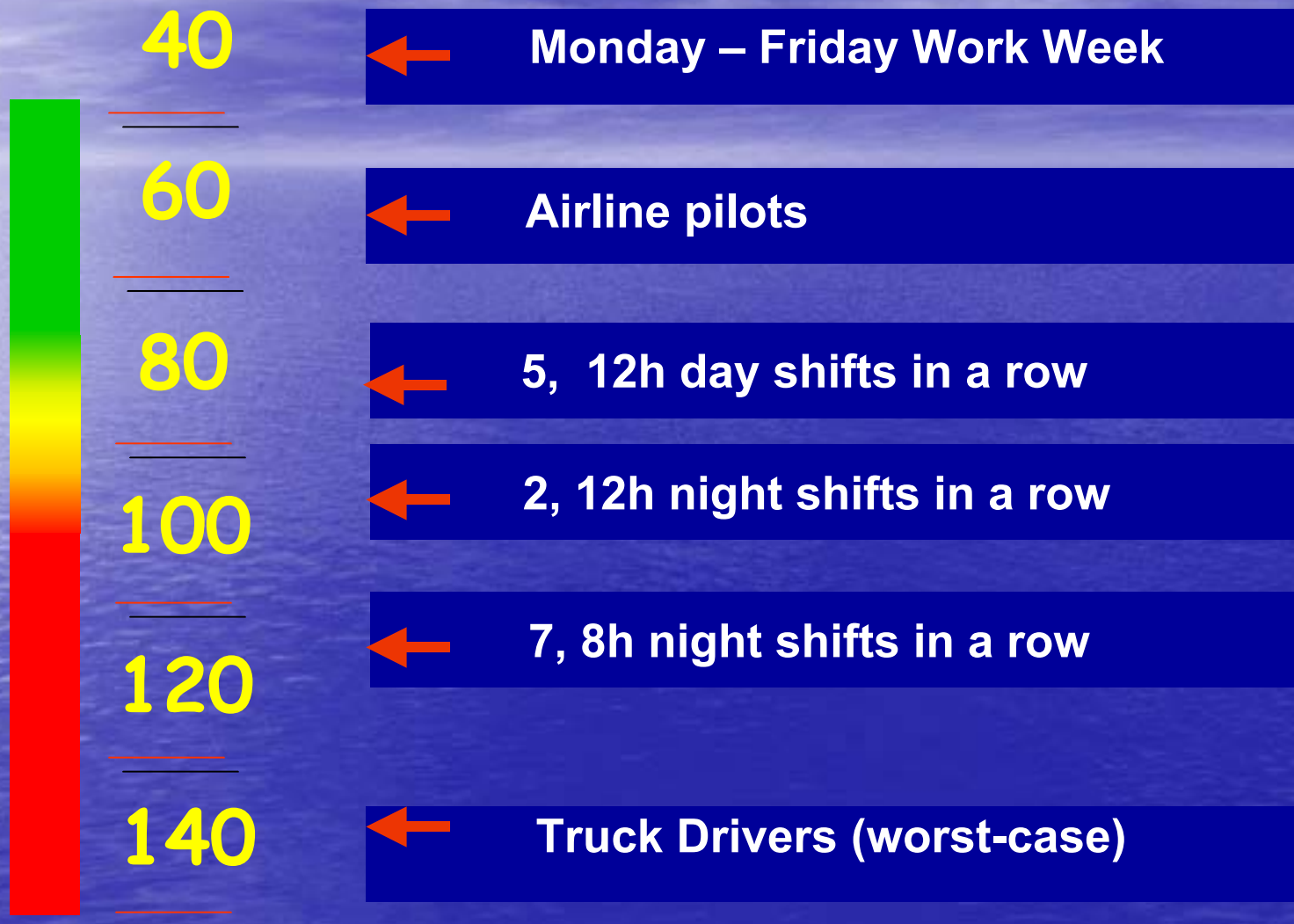
- A FAID® score of 80 has been associated with performance impairment equivalent to that seen at a blood alcohol concentration of 0.05% or greater



FAID

- Validation studies suggest that FAID® scores below 80 are broadly consistent with a safe system of work and scores above a 100 are broadly consistent with an unsafe system of work.
- These scores have been independently scrutinised and accepted as evidence by agencies including The Australian Transportation Safety Bureau (ATSB) and The Special Commission of Inquiry into the Waterfall Rail Accident near Sydney.

Indicative FAID® scores



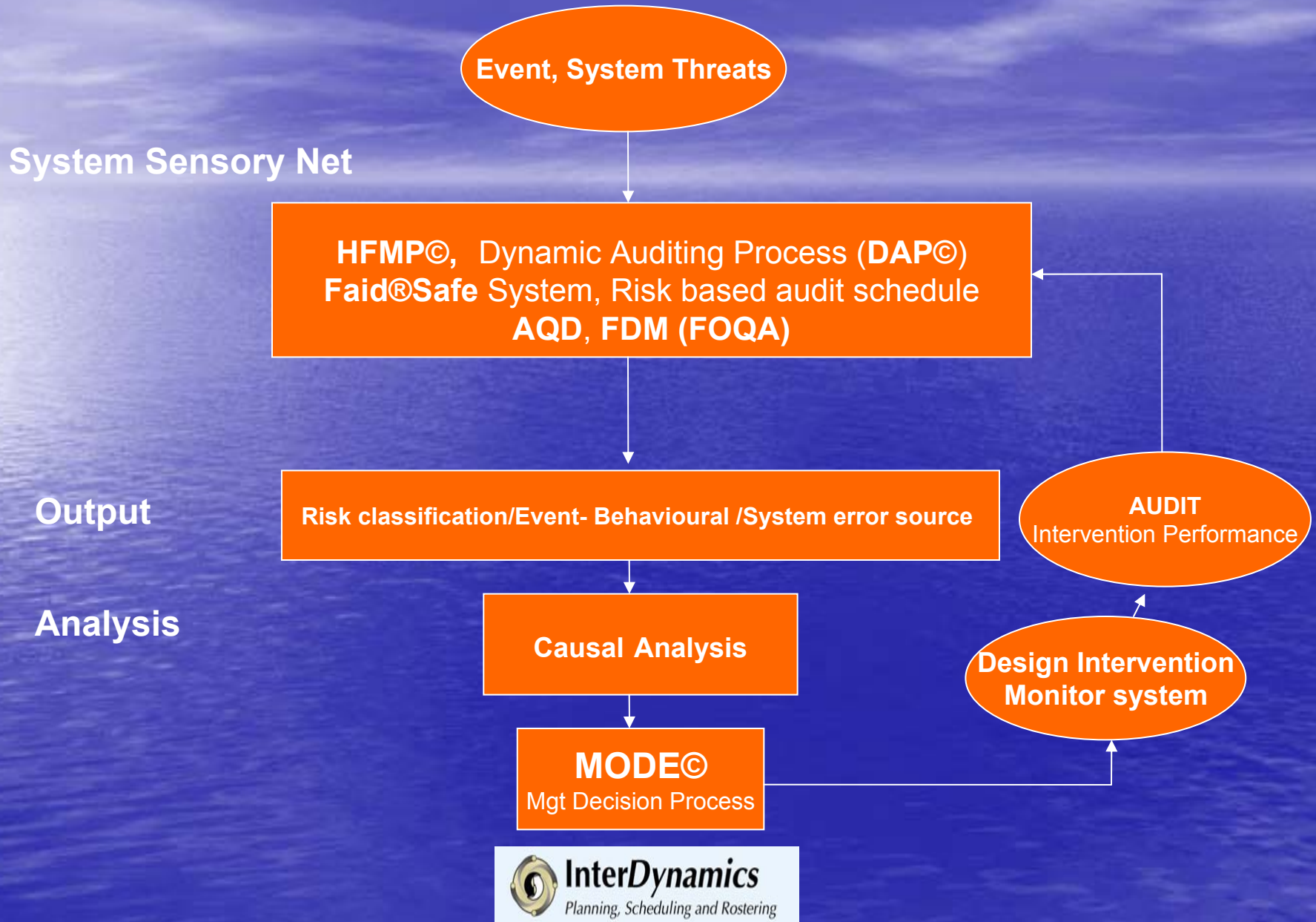


- FAID® should only be used as *one* tool within a Risk-based integrated Fatigue Risk Management Program
- Used by itself, FAID® is not a Fatigue Risk Management System

Case Study

- **easyJet Airline** (Based in the UK)
- >110 aircraft >60 destinations >16 Bases
- Substantial commitment to Fatigue Safety
- Have undertaken their own research on the safety, performance, communication, behavioural & leave impact of different work/rest cycles

System Integrated Risk Assessment (SIRA©)





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InterDynamics

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