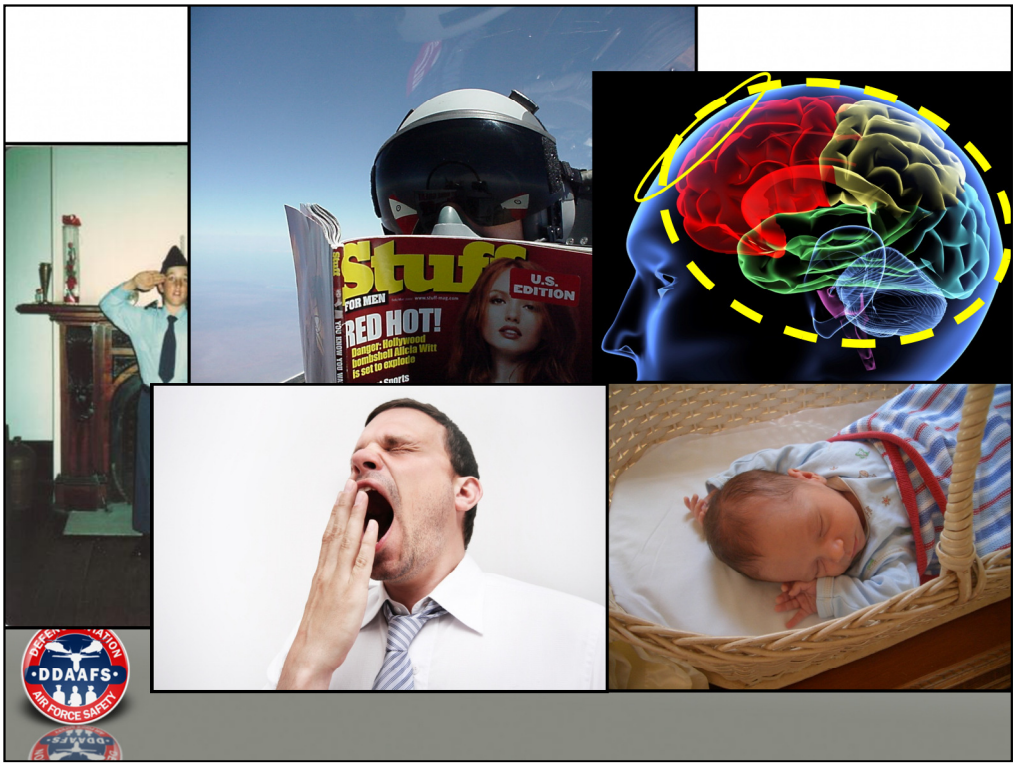
FRMS Regulatory Challenges: The Problem with Operators

Wing Commander Ben Cook

While there has been much activity to improve the identification and management of fatigue risks within the Australian aviation industry, in general, a number of initiatives have failed to improve the practical management of fatigue. At times, when combined with inadequate regulatory oversight, the outcome has been that operational personnel hold misguided perceptions regarding the efficacy of their fatigue risk management practices. Some areas, which remain topical and open to robust discussion include:

- over reliance on simplistic fatigue tools within an FRMS that in some cases have led to the mismanagement of fatigue risks;
- lack of clear guidance regarding the limitations of various fatigue tools;
- lack of predictive and pro-active processes and closed-loop quality assurance to confirm the effectiveness of fatigue risk controls and risk mitigation strategies.

This presentation will provide an overview of lessons learned through participation in the ICAO FRMS task force and some operational experiences drawn from surveillance within the Australian aviation industry. The aim is to highlight some of the challenges ahead with the practical integration and development of FRMS in accordance with ICAO standards, with a particular focus on the problems with operators and considerations to influence appropriate operator behaviour to provide improved fatigue management practices.



Wing Commander Ben Cook is the Deputy Director Human and Systems Performance for the Directorate Defence Aviation and Air Force Safety (DDAAFS), which encompasses human factors, systems safety, safety analysis and safety education and training. Ben and his team are actively working on a number of Australian Defence Force (ADF) projects and tasks to improve the management of fatigue within operational military settings. Ben has also enrolled in a PhD focused on better understanding and improving fatigue management within corporate jet and VIP operations (military and civil). While he recently returned to the Royal Australian Air Force (RAAF) his past roles have included Manager Human Factors for the Civil Aviation Safety Authority (CASA), during which time he served as the Australian member and facilitator Asia-Pacific for the ICAO FRMS task force. Ben was also the Manager Human Factors Field Operations for Airservices Australia, which involved human and systems investigations, including fatigue.

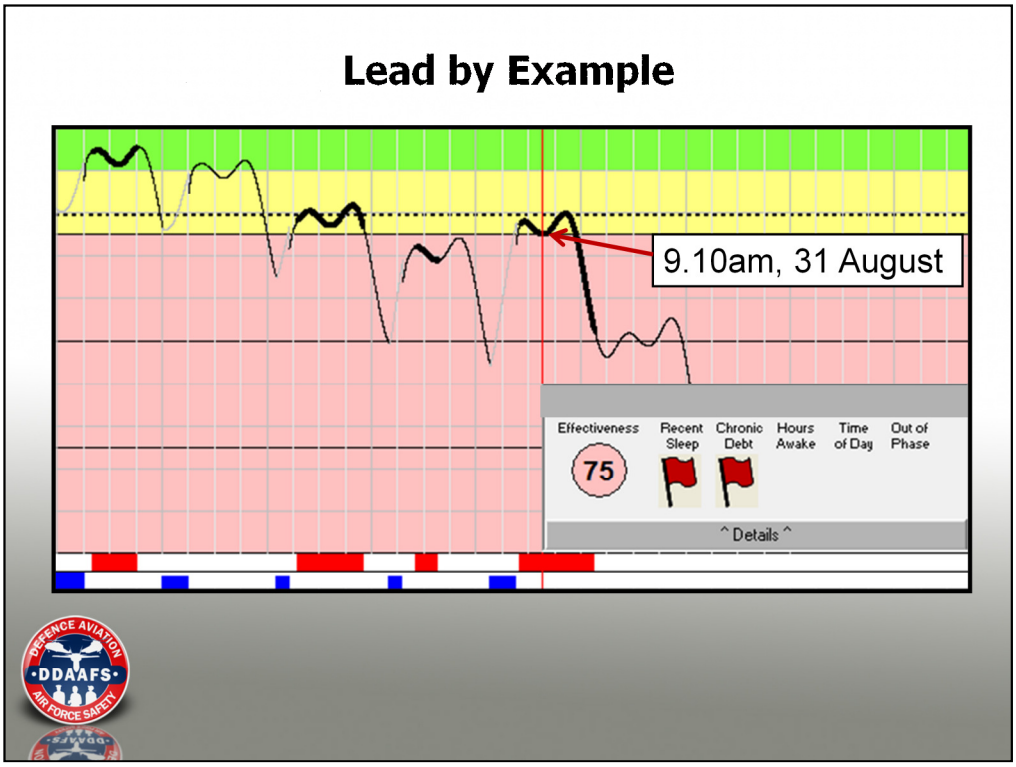
Ben has gained extensive operational experience with fatigue risk management (civil and military) across a broad cross section of the Australian aviation industry. This includes the investigation of fatigue incidents, auditing of FRMSs and development of fatigue guidance material to support operational needs.

He is a former military transport captain, flying instructor and low level aerobatics display pilot. Ben remains passionate about the return on investment that can be gained through enhanced fatigue management, including improved productivity and individual well being.

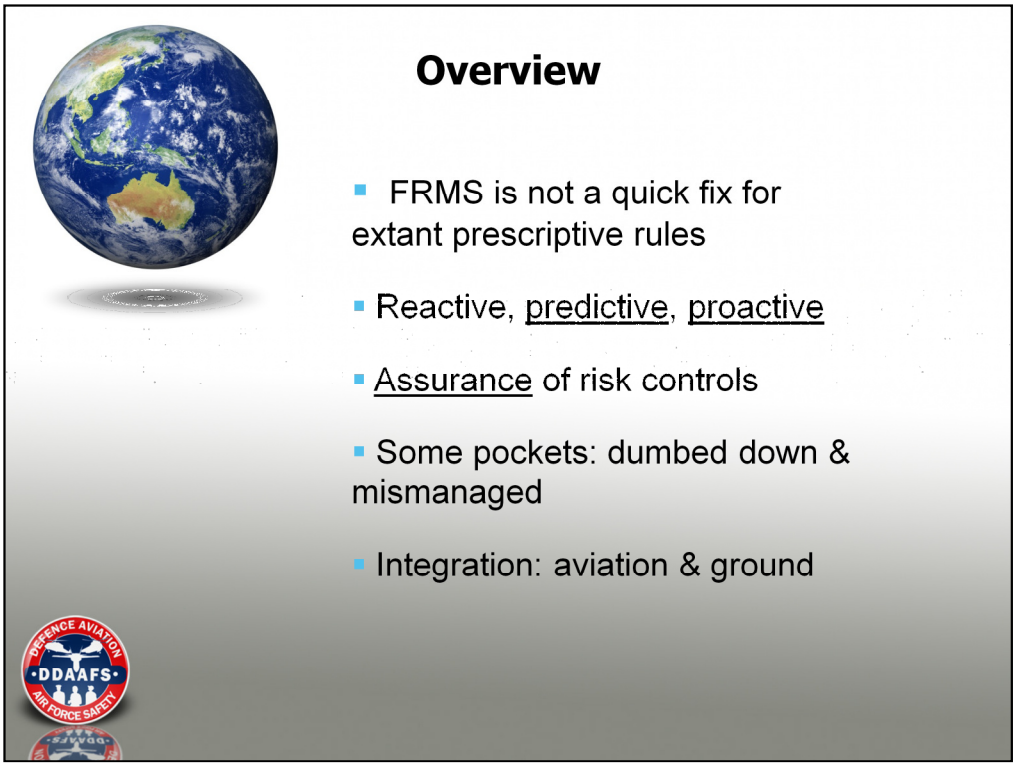
Some Cultural Advice re Australians & Kiwis

- Crossed 10-15 time zones
- Survey of Aussie and Kiwi attendees:
  - Local WOCL 3-5pm (Montreal time)
  - Best performance 1.30-3.30am (Montreal time)

The Australian and New Zealand participants have crossed a large number of time zones (10-14 depending on which direction they flew) in getting to Montreal. A quick survey of the Australian and New Zealand participants has found they reach a window of circadian low (WOCL) i.e. degraded performance between 3-5pm Montreal time. They also appear to be wide awake between 1.30-4.30am Montreal time. This may explain their propensity to stay out late i.e. they just want to show you their best performance!!



Ben has used predictive tools to optimise his alertness for this presentation.



Key Points:

•Important to have robust prescriptive rules as some operators will not be ready for FRMS. In particular, some smaller operators may not have the resources required to manage FRMS and to keep up to date with contemporary fatigue science.

•The area I believe the most work is required to influence operator behaviour is in the areas of predictive and pro-active assurance processes. It is not good enough to make changes and assume a lack of fatigue reporting indicates the changes have been successful. Operators must demonstrate a commitment to gather data post change to provide assurance the changes are as safe or safer than previous operations.

•For some operators overreliance on simple tools has degraded their ability to understand and manage fatigue risks.

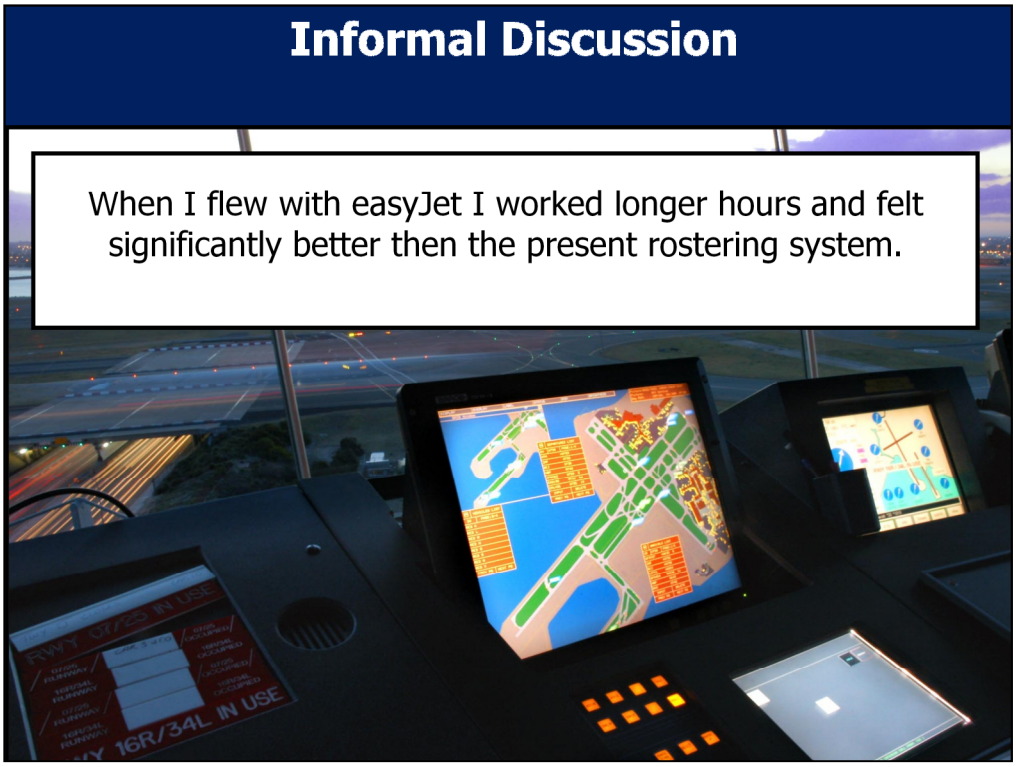
•There is a need to consider ground based operations i.e. the flight has been managed safely but what about crew risk with driving their motor vehicles home? This requires an SMS to be integrated to ensure it considers both aviation safety and occupational health and safety issues collectively.

The way we perceive fatigue influences the way we behave

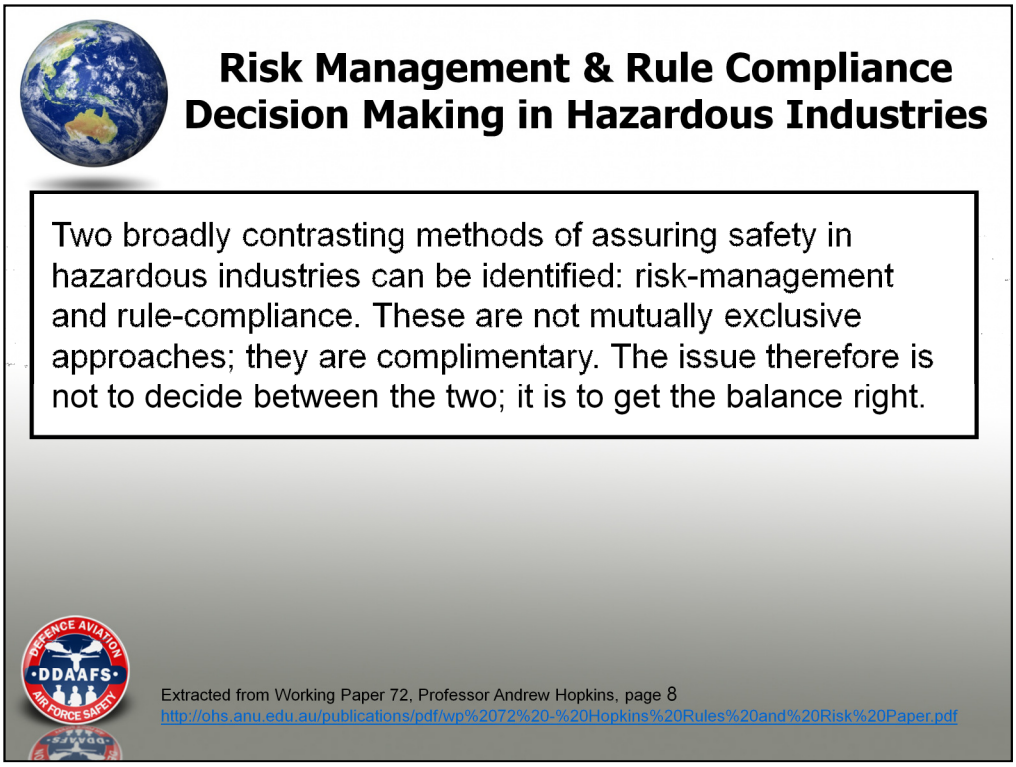
Prof. Philippe Cabon (Paris Descartes University)

Has Fatigue Been Topical Locally?

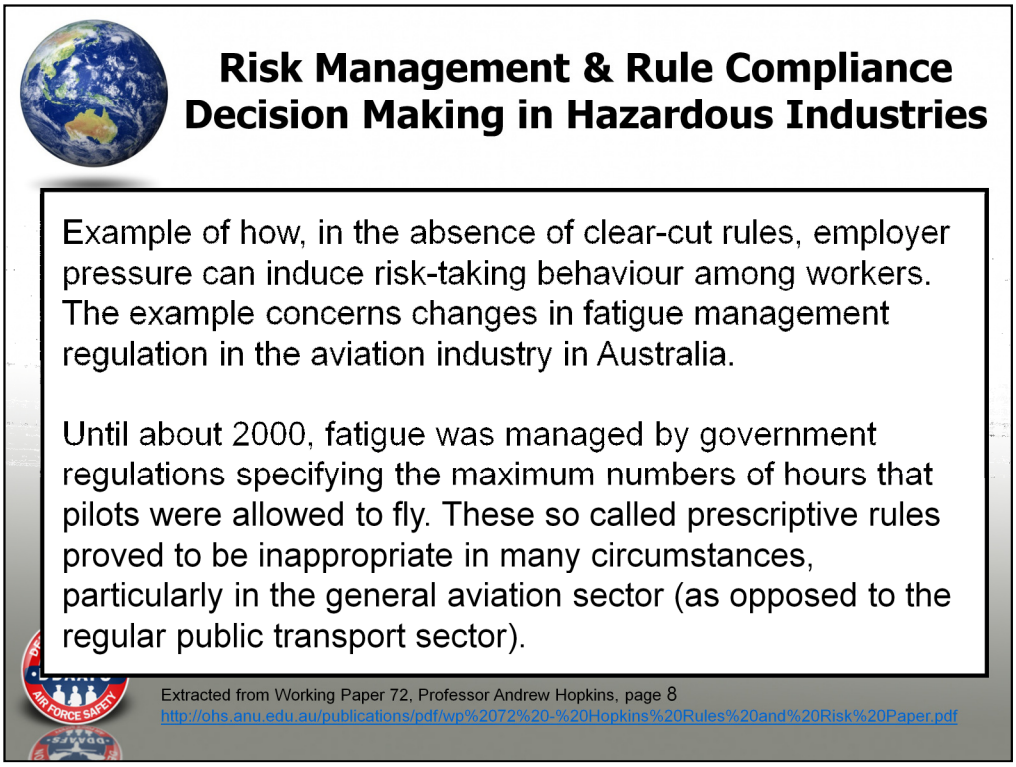
Some recent examples of material appearing within the Australian media. Fatigue has become a topical subject within the media.



A recent discussion from a pilot who flew with easyJet, which has utilised contemporary FRMS practices to manage fatigue, when compared with rostering practices within another airline utilising prescriptive regulatory practices. It was a good insight into the benefits afforded by well implemented FRMS and indicates crew can fly increased hours and feel better through the use of FRMS.



Extract form a paper by Professor Andrew Hopkins, Working Paper 72 titled *Risk Management and Rule Compliance Decision Making in Hazardous Industries.* While the paper is not specific to fatigue it contains references to fatigue management within the Australian aviation industry, in particular some of the adverse outcomes and behaviours of operators.



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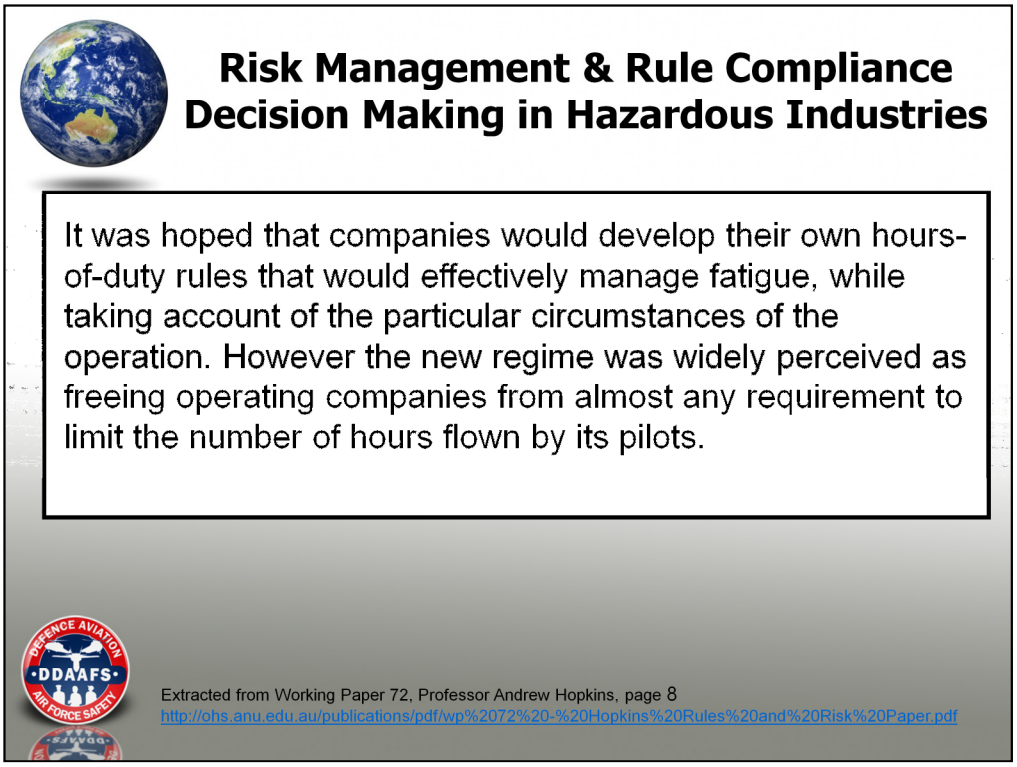

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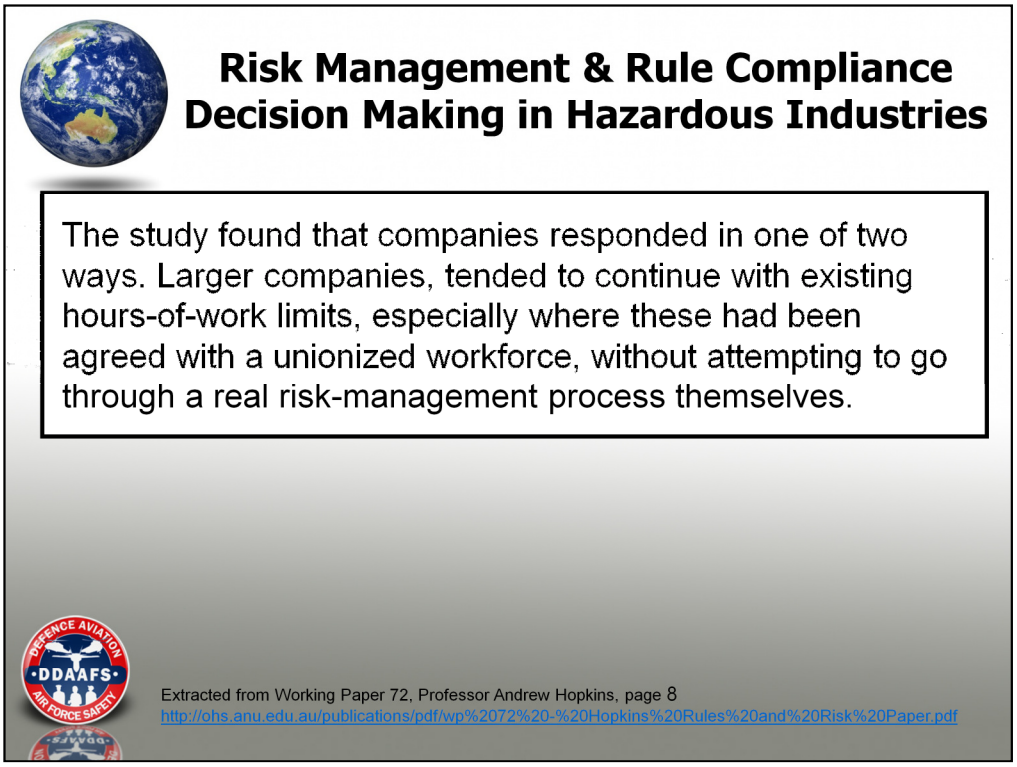

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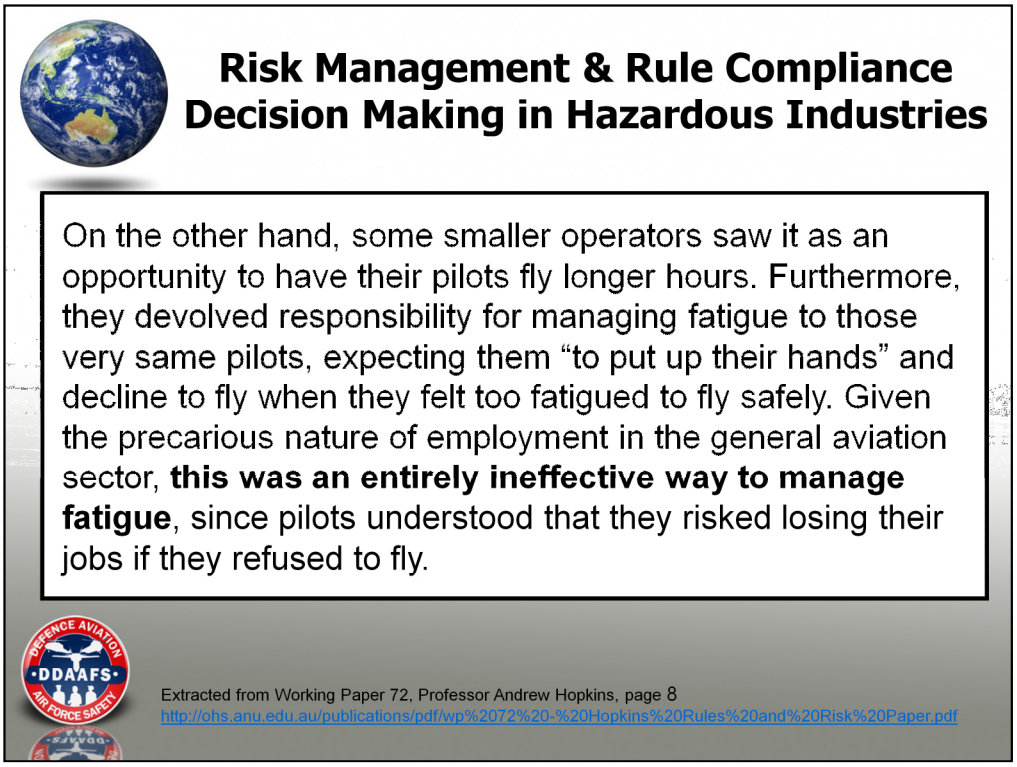

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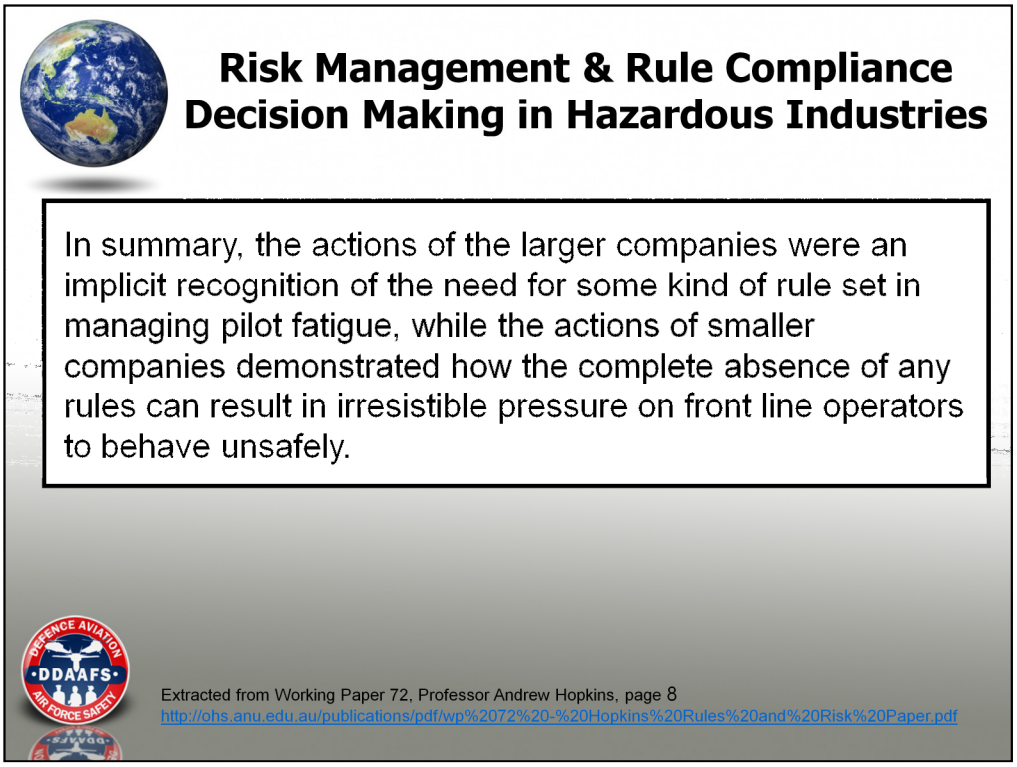

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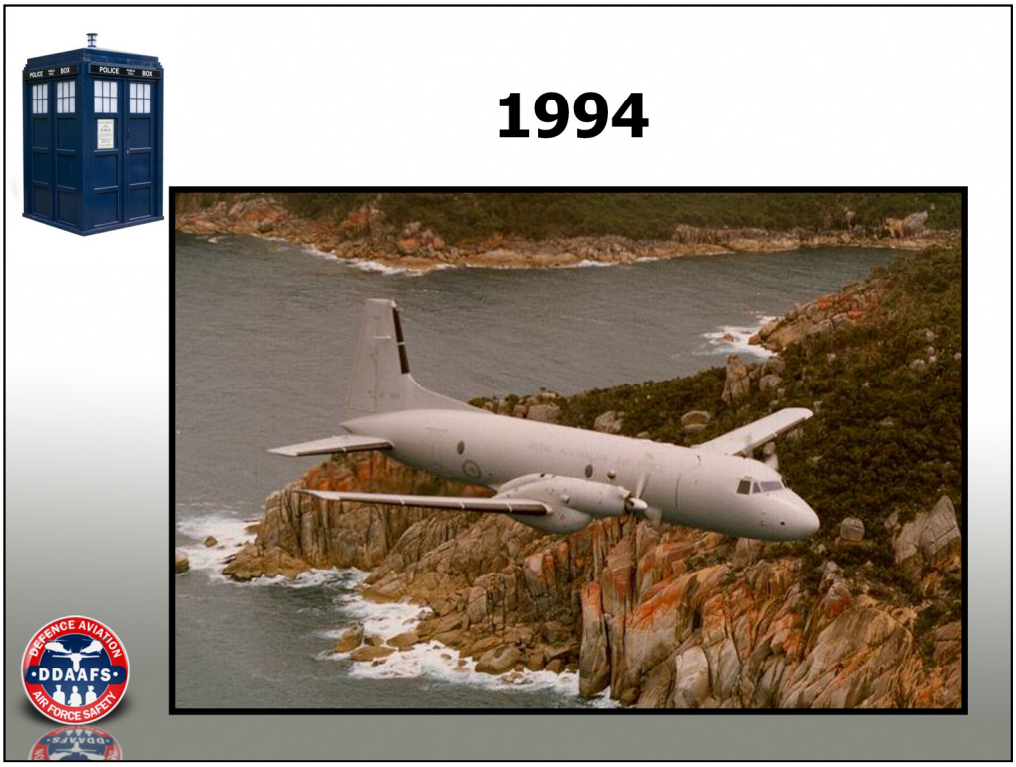
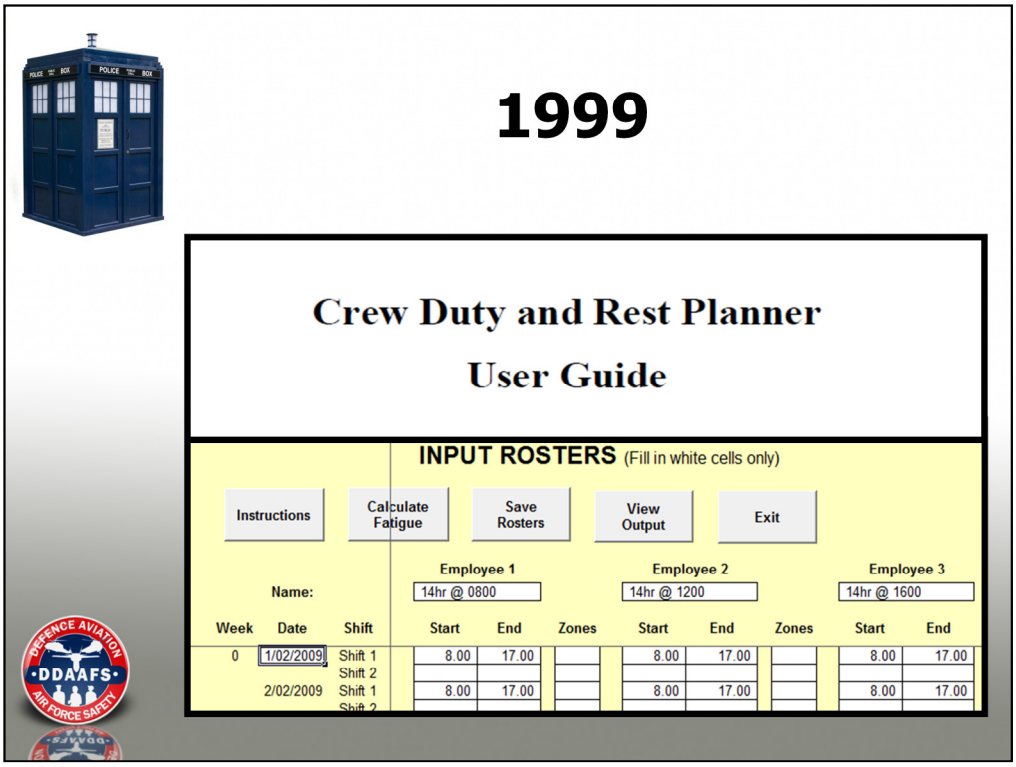
As Australia commenced down the FRMS path in 2000, the region has some extensive experience across the Australian aviation industry regarding fatigue management across all sectors of aircrew and air traffic control. The following slides provide insights into the lessons learned over the past ten years.



My first experience of poor fatigue management occurred in 1994 and involved a 24 hour crew duty. At the time this involved decision making from the aircraft Captain, who was also the Squadron Commanding Officer, who self authorised an extension to crew duty based on having an extra crew member on board sitting in the jump seat. That crew member was me and the process offered minimal opportunity for any quality rest or formal processes to mitigate the fatigue risks. It was just assumed an extra set of eyes in the cockpit was sufficient to mitigate the risks. This has improved significantly within the Australian Defence Force since this time.

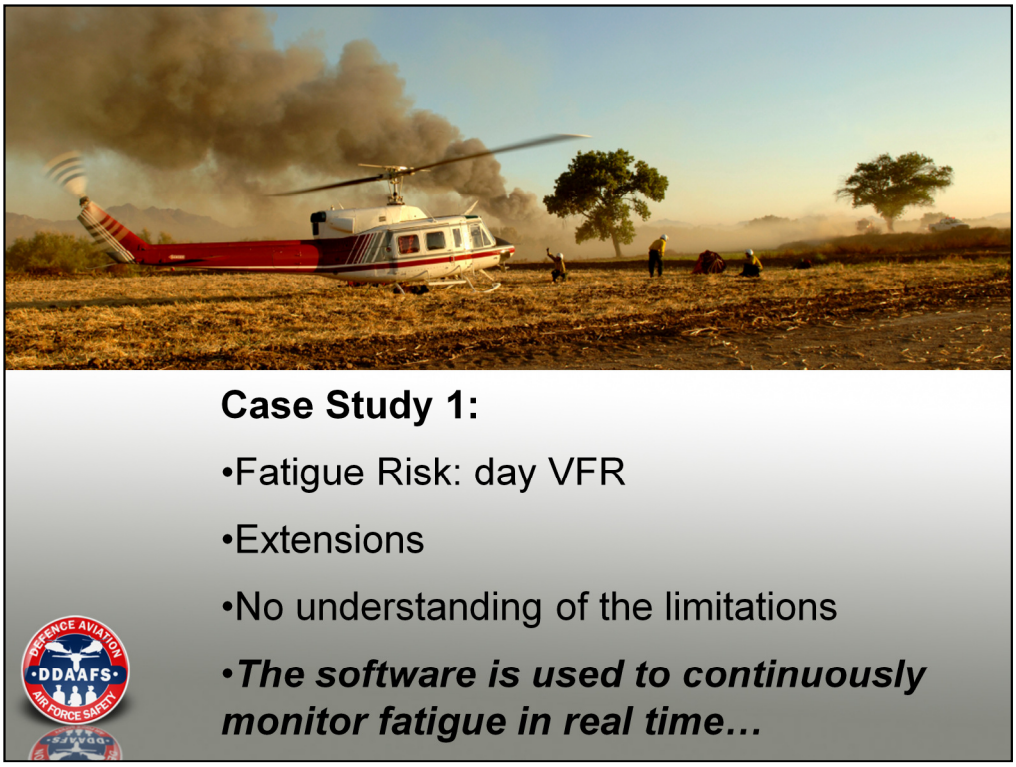


The first experience of the use of simple tools for predicting fatigue risks. The Australian Defence Force adopted a product called the Crew Duty and Rest Planner. Minimal guidance was provided on the limitations of the tool hence in many cases the tool was used inappropriately and provided a false sense of security regarding fatigue risks. Uptake of the tool was small.

2005 was my first opportunity to look more closely at the efficacy of the Crew Duty and Rest Planner. In a joint exercise with the Royal Australian Air Force (RAAF) Institute of Aviation Medicine (AVMED), Mr Mark Corbett and I spent ten days as human factors practitioners as part of a review of Caribou mountainous operations in Papua New Guinea.

As part of this review crew duty times were recorded and placed into the Crew Duty and Rest Planner. The outcome was a mismatch between the tool (model) and the actual fatigue risks. The tool was suggesting fatigue should not be a problem whereas fatigue was one of the risks being managed during the ten days of this deployment. This provided opportunity to calibrate the tool and to consider a more accurate baseline score for predictive planning.

As an interesting follow up the suggestions regarding scores from the ITSR transport safety alert number 35 match the findings of this earlier field work i.e. a score significantly lower than that suggested by the modelling tool should be used for predictive work. The ADF Crew Duty and Rest Planner is a simpler, military version of FAID, which was the model reviewed by ITSR.



The operator in this case study provided civil helicopter resources in support of fire fighting. The operator had implemented and had an FRMS approved by the regulator for a number of years. In the absence of any feedback to the contrary from the regulator they believed their FRMS was providing a good standard of fatigue management.

Actual review of the FRMS uncovered a number of deficiencies, including the over reliance on simple modelling tools, poor understanding of the limitations of such tools and a number of work arounds within the FRMS e.g. long crew extensions when confronted with fire fighting scenarios that allowed crew duty to be extended with minimal scientific justification to explain how these extensions were being managed.

As Manager Human Factors for the Civil Aviation Safety Authority I had received a number of telephone calls from helicopter pilots in response to safety promotion articles regarding fatigue management. The discussion from the pilots indicated management regularly told them if their scores were below the generic score provided by the simple modelling tool then they were good to fly. Many of these pilots would suggest they should not be flying due to their concerns with fatigue.

Case Studies 2 & 3:

- Fatigue Risk: CFI mock scenarios
- Relationship with the regulator
- Contemporary fatigue science
- No awareness of system e.g. split duty & limitations – over reliance

As part of a review of a smaller regular public transport operator with an approved FRMS, the FRMS accountable manager (in this case the Chief Flying Instructor) was asked a number of operationally focused questions regarding fatigue management. This was established by first asking what fatigue risks they were confronted to get a realistic understanding of the types of scenarios that exposed them to increased fatigue risks. A mock scenario was then established involving a pilot calling the CFI for further advice regarding fatigue management and whether he should be continuing a flight. In this case the CFI did not demonstrate a sound understanding of contemporary fatigue or risk management practices (e.g. sleep obtained during the day layover, what type of approach at the end of the flight, weather patterns, workload for arrival etc) and it became apparent a simple tool and score was being used as the sole discriminator as to whether the pilot should fly.

Furthermore, when highlighting some of the limitations of their current approach it became apparent the regulator had played a large role in leading them to the FRMS they were presently operating, including regulatory inspectors helping revise and update their existing FRMS.

Case Study 4: Success Story

- No simple tools
- Culture of trust & commitment at all levels
- Keeping up with contemporary fatigue science

While this operator was not formally audited by myself the style and tone of their FRMS documentation was considered more advanced than other FRMS documentation that had been reviewed. The language used did not offer loose work arounds and focused on direct use of words such as ‘must’ and ‘will’ rather than ‘might’ and ‘may’. This operator trialled some of the simple tools and elected to not use them as they believed the tools were not effective with improving their ability to manage fatigue risks.

FRMS

- minimise occasions when…
- dependent upon operational requirements…
- extended duty up to 16 days…
- flight duty may be extended…pilot may exceed acceptable score…

versus

- we do not allow for split duty at all…
- we absolutely prohibit pilots from being disturbed for routine meetings whilst on rest…
- we prohibit rostered duty in excess of 7 days…
- we will not permit…

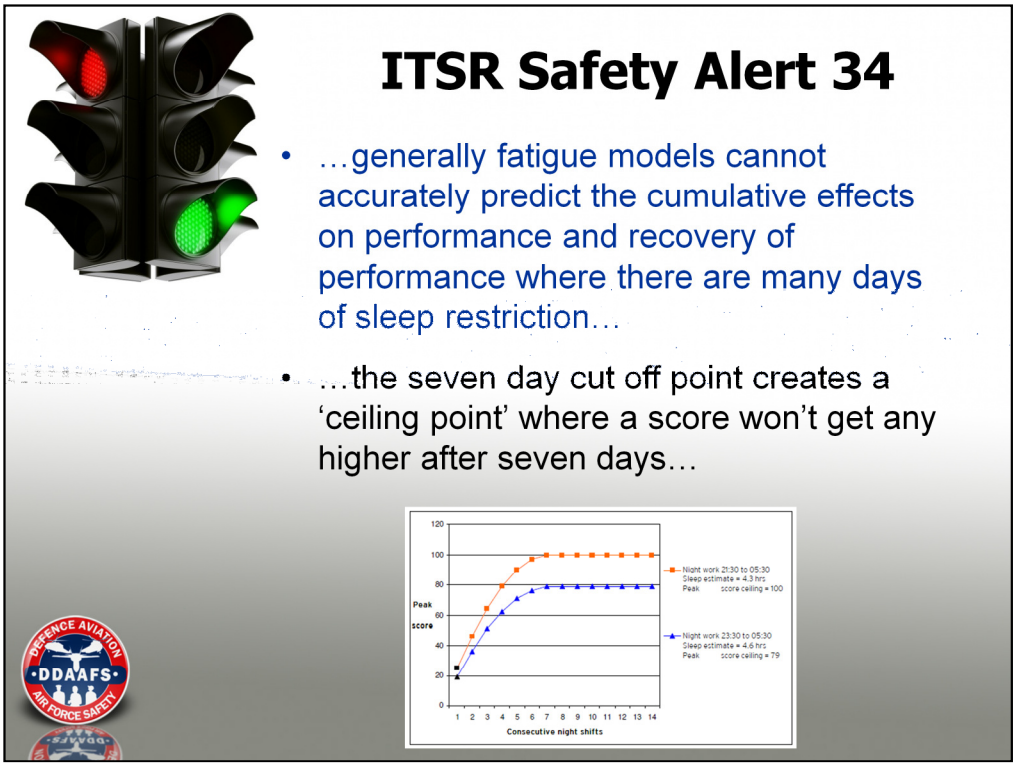
You need to be aware of the 'get of jail free' cards within FRMS documentation. Loose use of words to provide operators the ability to increase shifts and duty hours in the absence of a safety case to support may be indicative of poor fatigue management practices. The examples above are short extracts from local FRMSs to highlight the differences in the style and tone. The red is a style and tone that warrants close review, the green section is a style and tone that affords a stronger commitment to managing fatigue risks. This is purely a preliminary feel for the documentation, as the only way to ensure an FRMS is managing fatigue is through a more detailed audit, including evidence to substantiate.

The next section briefly touches on the issues regarding the behaviours that can result through the over reliance on simple fatigue tools.

For every complex problem, there is invariably a simple solution, which is almost always wrong

H.L Mencken

NAVY | ARMY | AIR FORCE



The Independent Transport Safety Regulator (ITSR) administers rail safety law in New South Wales for all NSW rail operators, including a strategic coordination of safety across all modes of transport. ITSR released transport safety alert number 34 to highlight some issues surrounding the use of a fatigue modelling tool, which has been extensively utilised within Australian rail operators. A full copy of the alert is available within this presentation.

Web Link:

http://www.transportregulator.nsw.gov.au/rail/publications/tsas/Transport%20Safety%20Alert%20-%20Number%2034%20-%20Use%20of%20bio-mathematical%20models%20in%20managing%20risks%20of%20human%20fatigue%20in%20the%20workplace%20-%2027%20July%202010.pdf

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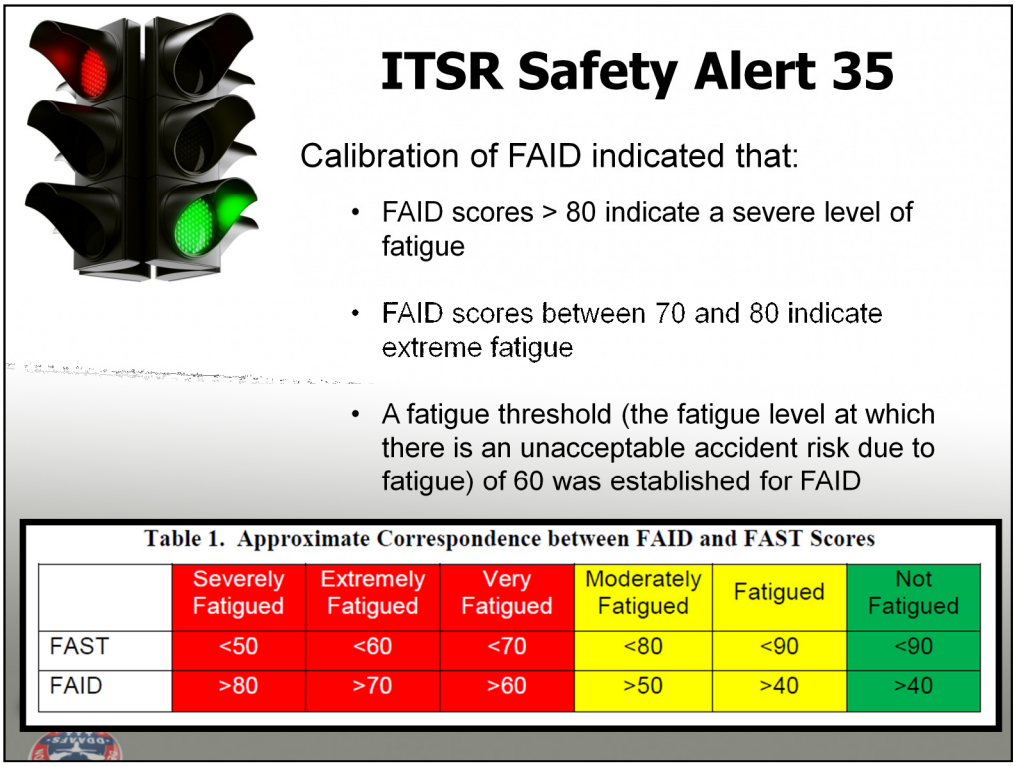

The Independent Transport Safety Regulator (ITSR) administers rail safety law in New South Wales for all NSW rail operators, including a strategic coordination of safety across all modes of transport. ITSR released transport safety alert number 35 to highlight some further issues surrounding the use of a fatigue modelling tool, which has been extensively utilised with Australian rail operators. Benchmarking of models is going to become an important issue given the tendency for some operators to 'model' shop. A full copy of the alert is available within this presentation. The Federal Railroad Administration (FRA) rejected some of this research and have elected to use a percentage of operations below a score of 72.

Web link:

http://www.transportregulator.nsw.gov.au/rail/publications/tsas/Transport%20Safety%20Alert%20-%20No%2035%20-%20Use%20of%20bio-mathematical%20models%20of%20human%20fatigue%20-%20January%202011.pdf

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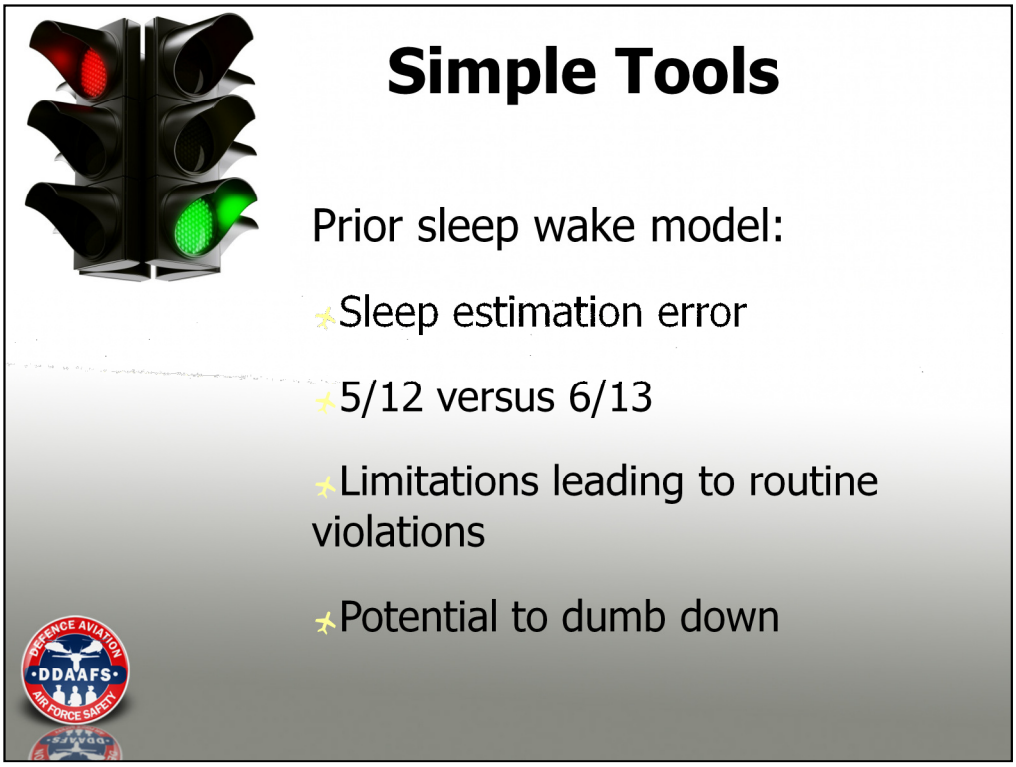


The use of prior sleep wake models is growing within Australia. These tools have not yet been validated.

An ongoing concern remains that some local research within the ADF suggests individual assessment of sleep obtained is typically 15% in error i.e. individuals tend to overestimate the amount of sleep. Given the mixed literature on whether personnel require 5 versus 6 hours of sleep in the previous 24 and 12 versus 13 hours of sleep in the previous 48, the use of the 5/12 rule combined with over estimates of actual sleep obtained may be problematic.

Furthermore, given the complexity of fatigue and other factors that must be considered in the operational environment, the use of such a tool is considered too simplistic to manage fatigue with consideration to the broader risks e.g. weather, type of approach to be flown for landing, minimum equipment list, terrain etc.

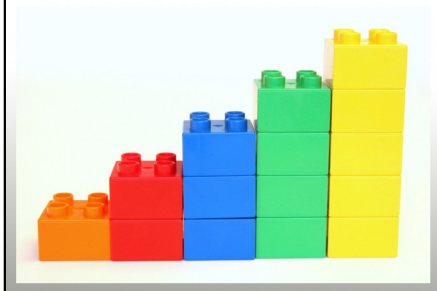
Lessons from the Field

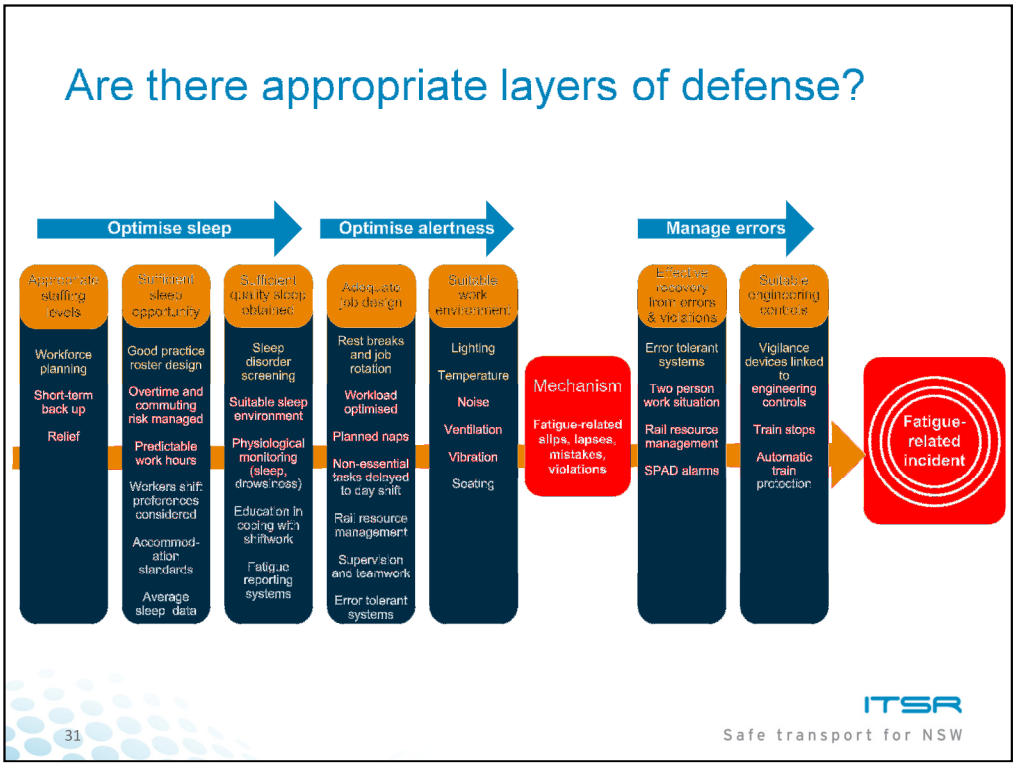
- You must be aware of the limitations of simple tools
- Overreliance has been a significant problem
- Consider model shopping
- Federal Railroad Authority (FRA) regulations mandating use of biomathematical models & specific thresholds within prescriptive rule set

Lessons from the Field

Operators: start with the basics

- SMS: how to ident hzds & manage risk
- Safety Culture: mutual trust & healthy reporting
- An iterative process of trial & validation - start small
- Don't underestimate commitment & resources
- Quality assurance: reactive, predictive, pro-active





Slide courtesy of the Independent Transport Safety Regulator (ITSR) administers rail safety law in New South Wales for all NSW rail operators, including a strategic coordination of safety across all modes of transport.

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Lessons from the Field

Regulators:

- Consider industry behaviours before recommending a specific commercial product
- Consider evaluation templates
- Independent specialist support considerate of commercial products & possible conflicts of interest
- Balanced guidance material

Lessons from the Field

Regulators:

- Program management considerate of resources available to industry & regulatory workload
- Regular 'systems' audit to ensure improvement over time – if it goes 'pear' shaped it can happen quickly
- Critical to consider resources before pushing too many operators to FRMS too quickly

In Closing.....

- Where would you need to go to visit the world's most liveable city?
- Melbourne, Australia!

The Globe and Mail, Wedneday, 31 August

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