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RNZAF FATIGUE MODELLING AND MITIGATION STRATEGIES

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RNZAF OVERVIEW

- 2400 Active Military Personnel
- 5 Operational Squadrons
- Key personnel to mitigate: 500 Active Aircrew and 900 Maintenance and support crew
- All remaining personnel will be affected by fatigue at some point in their career

COMMON FATIGUE RELATED ISSUES

- Long duty periods, shift work, environmental stress extended wakefulness and limited sleep opportunities can lead to:
  - Poor subjective ratings of fatigue, objective measures are required
  - Flight or ground safety events
  - Compromised metabolic health
  - Decreased resilience
  - Reduced morale

RNZAF FATIGUE RISK MANAGEMENT

- The RNZAF has historically employed a single layer rules based system of orders and guidance to limit fatigue and enhance safety and productivity of personnel
- It has now been recognised that this approach has several limitations and in many instances will not effectively protect personnel from substantial levels of fatigue and the resulting risks

- Implementation of a Fatigue Risk Management System (FRMS)with multi layers and control systems at both organisational and individual levels would go much further to protect both the organisation and individuals from fatigue
- Consequently, the components and framework of a multi-layered FRMS are being constructed and trialled by the Aviation Medicine Unit (AMU) and the Directorate of Air Force Safety and Health (DASH)

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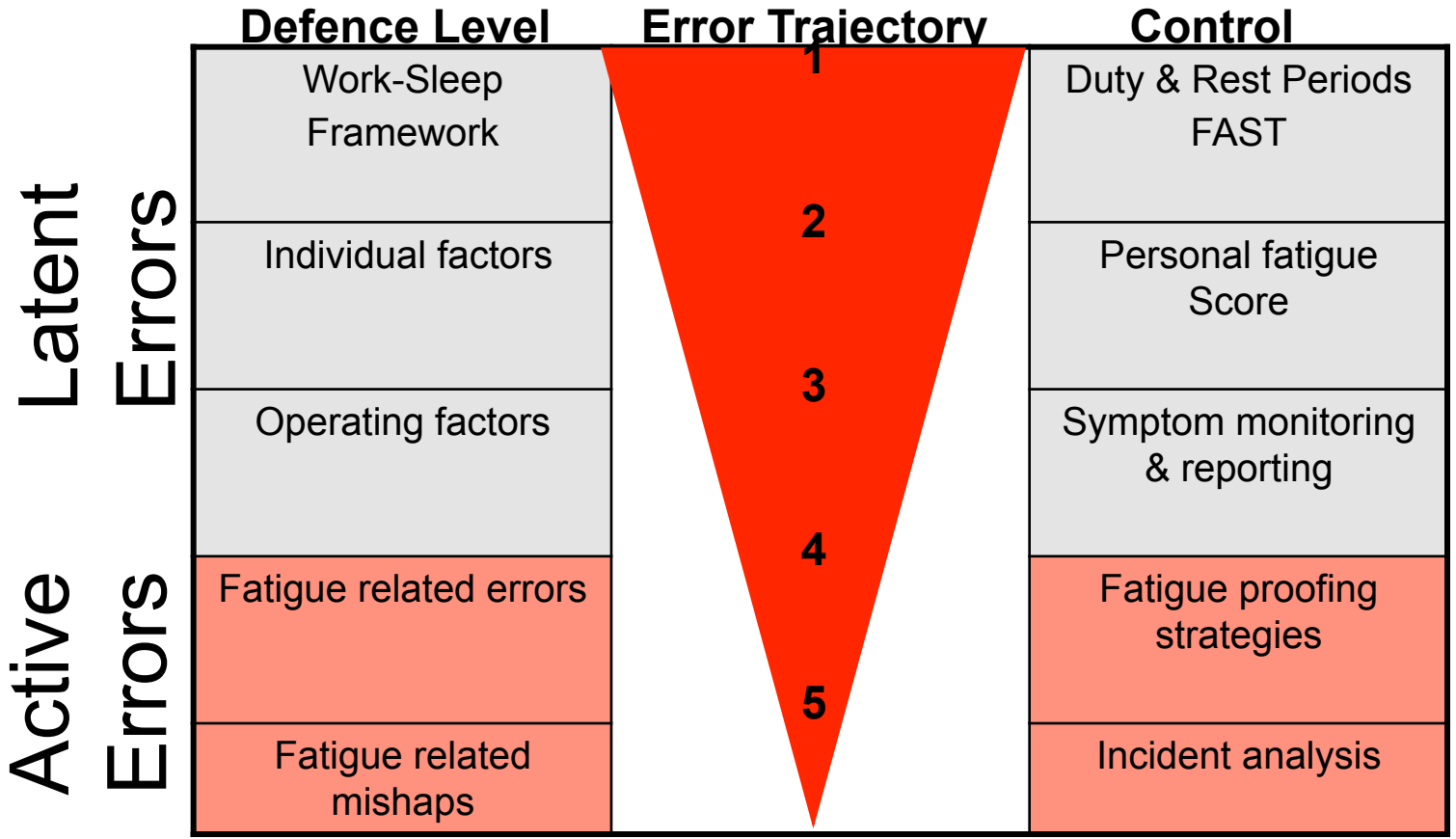
RNZAF – FRMS 'DEFENCE IN DEPTH'



SPECIFIC COMPONENTS OF THE FRMS

- Duty periods and rest intervals
- Fatigue modelling software
- Personalisation of individual fatigue countermeasures
- EDUCATION!!

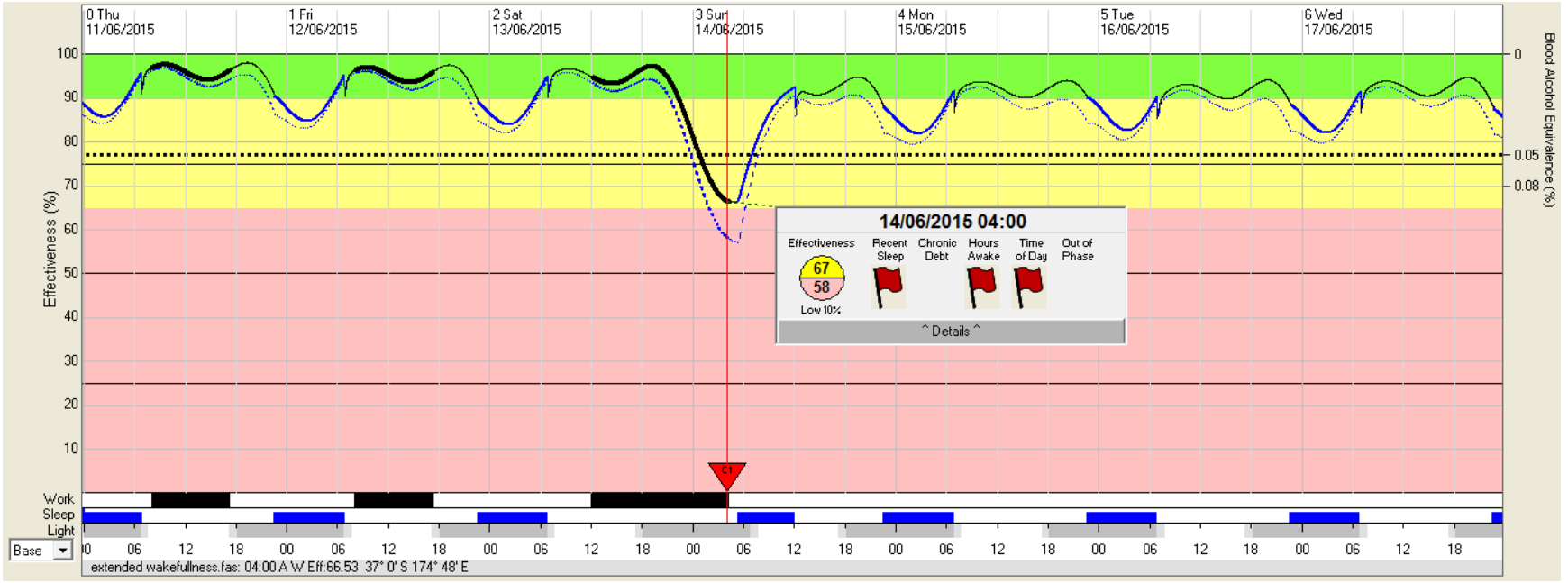
DUTY PERIODS AND REST INTERVALS

- Incorporation of prior-sleep wake rules to make current duty limits valid for afternoon or evening shifts.
- Need to take into account circadian disruption due to travel or shift work
- Reliable records of sleep, objective and subjective measures of fatigue required to support changes to duty limits and rest periods
- Transport home following duty periods where fatigue is highlighted as a risk

FATIGUE MODELLING SOFTWARE

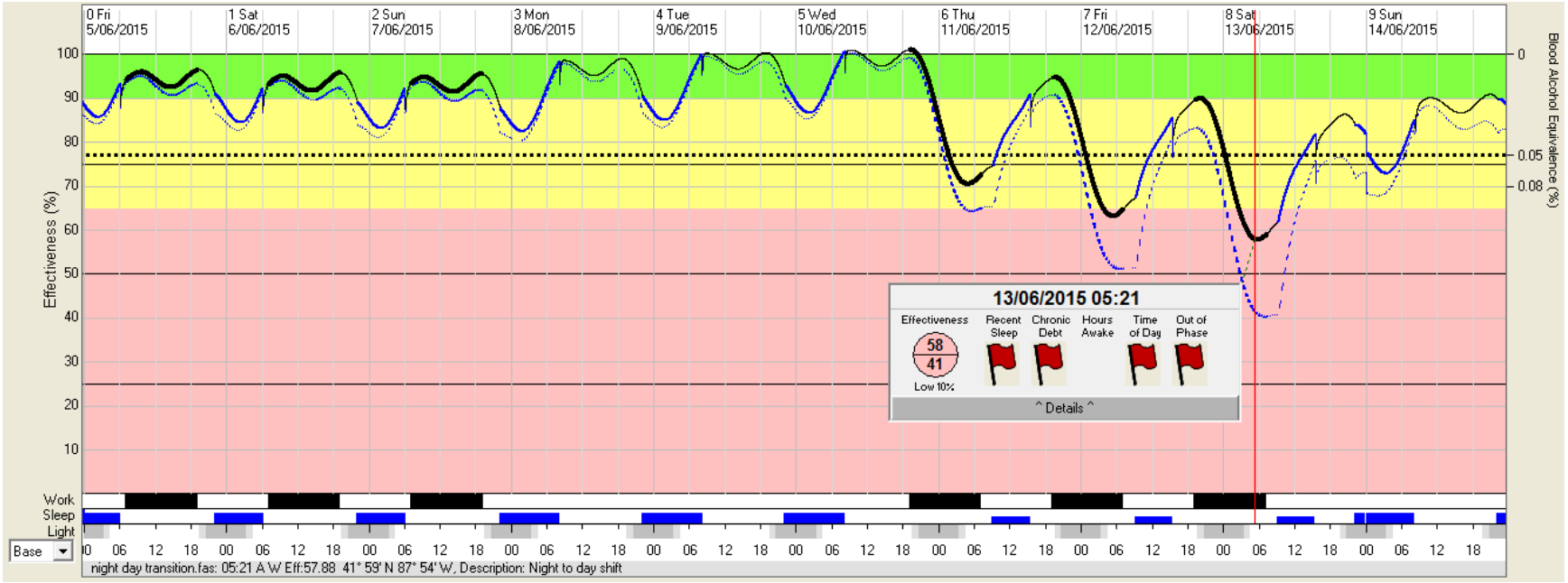
- The Fatigue Avoidance Scheduling Tool (FAST) has been informally trialled since 2010. Generally used to investigate Flight Safety Events and deficiencies in operational schedules.
- Crew Alert has been informally trialled since 2015. Generally used to highlight deficiencies in operational schedules

FAST: EXTENDED WAKEFULNESS



CREW ALERT: EXTENDED WAKEFULNESS

FAST: DAY TO NIGHT SHIFT



- AMU is now working with Operational Squadrons to encourage procurement of FAST or Crew Alert and proficiency in the generation of fatigue reports
- AMU then reviews the report and provides mitigation advice if fatigue is highlighted as a risk factor
- Several additional models are emerging across various platforms (IOS, Android, Windows) and will be considered when available.

OBSERVATIONS

- FAST
  - Provides the capacity to generate multiple scenarios and categorize risk in terms of an equivalent blood alcohol
  - Expensive and not very user-friendly
  - Over estimates fatigue risk in eastward travel
- Crew Alert
  - User-friendly, cost efficient and provides a good representation of deficits in cognitive performance following periods of extended wakefulness.
  - Provides a realistic estimate of fatigue in eastward travel
  - Limits the input of sleep data to duration

PERSONALISATION OF INDIVIDUAL FATIGUE COUNTERMEASURES

- Caffeine or “Military-Approved” Pharmacological Countermeasures?
- Caffeine Gum
- Sleep medication
- Diet and exercise
- Actigraphy, EEG, sleep hygiene, light therapy
- Fatigue related flying or work rules

EDUCATION

- Regular education on fatigue recognition and mitigation
- Distribution of relevant resources and publications
- Widespread distribution of fatigue modelling Apps?
- Education at Squadron, Unit and family level

SUMMARY

- The framework of a multi layered FRMS has been established
- Key components of this system are been trialled
- Fatigue modelling software, objective measures of fatigue and sleep tracking will be important tools.
- Acceptance of change and acknowledgment that we need to mitigate fatigue more effectively are substantial challenges for the RNZAF.

CONTACT DETAILS

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