Human Factors in Flight Operations

A CAANZ Perspective

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Scope

1. Importance
2. Current Regulatory Framework
3. Change Initiatives
4. Present Industry State
5. Desired Future State

Importance

- *ICAO SMM - Risk Assessment and mitigation (9.4.2)*

"Safety risk controls must be designed and implemented. These may be additional or changed procedures, new supervisory controls, changes to training, additional or modified equipment, or any of a number of alternatives."

Importance

- *Human Factors initiatives can be implemented now*

Importance

Avoid airline accidents

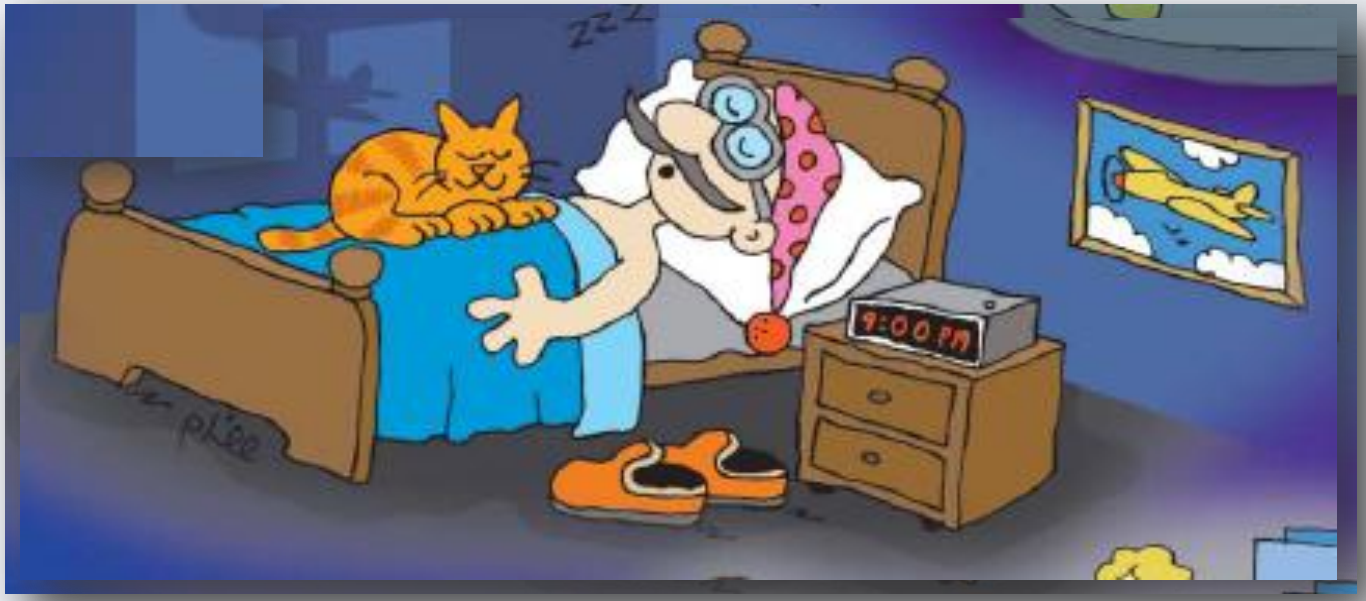
- ILOC - CFIT - Runway excursions - Runway incursions

Current Regulatory Framework

- Rules, Advisory Circulars
- Aircraft Certification
- Medical fitness

Current Regulatory Framework

- Fatigue
- Safety Culture (AC 00-3)
- Reporting HF events (AC 12-1)



Current Regulatory Framework

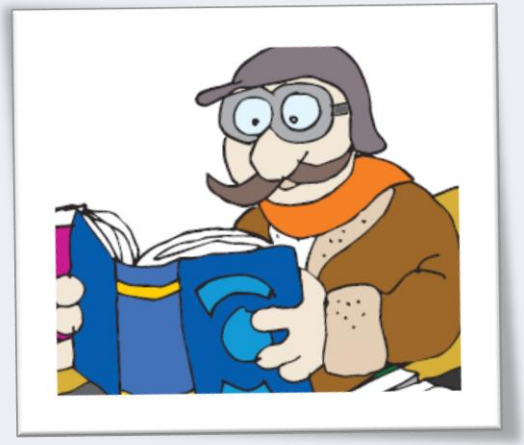
- Human Factors training - CPL, IR (AC 61-5)
- Air Transport Operator training programmes (exposition acceptance)
- Flight check system (operating procedures)

Operating Procedures

- *The certificate holder shall ensure that the [flight check] system enables safe real-time decision making and aeroplane management by conforming with the principles —*

1. contained in the aeroplane flight manual; and
2. contained in the manufacturer's technical and safety instructions; and
3. of crew resource management; and
4. of human factors and psychology; and
5. of ergonomics.

(NZCAR 121.77)



Change Initiatives

- Part 121 Rule Development
- AC 121-4 Human Factors Training
- SMS Implementation
- CAA Inspector training

Rule Development

Part 121 (large aircraft) – Crew member training & competency assessment

- NPRM
- Human Factors training
- Flight crew and cabin crew
- All phases of training
- Instructor & Examiner competency

Rule Development

Part 125 (medium aircraft)
Crew member training
& competency assessment

- technical development;
- safety case
- will be similar to Part 121

Advisory Circular Development

AC 121-4 Human Factors Training

- Initial draft completed
- Will be released for comment
- Joint industry-regulator effort
- Consideration of available reference documents
- Changes to crew member training approach
- Investment in instructor/examiner training

Advisory Circular Development

Key concepts

- Integration of technical & non-technical skills
- Behavioral marker system not prescriptive
- Instructors and examiners must be competent in evaluating non-technical skills

Advisory Circular Development

Key concepts

- Acceptable means of compliance with Rules
- Training: classroom → simulator → aircraft
- Flight crew & cabin crew
- All phases of training

Present Industry State (NZ)

Some operators have limited approach to incorporating Human Factors

- Classroom training (CRM)
- Crew member simulator and aircraft training is focused on technical skills
- Consideration given to HF (e.g. Reason codes) in occurrence investigations
- Flight & Duty schemes prescriptive

Present Industry State (NZ)

- Some operators are increasingly including Human Factors in all aspects of training and operations
- Operator examples:
  - Air New Zealand
  - Jetconnect
  - Pacific Blue Airlines
  - Air Nelson

- Note: These operators have been selected to illustrate the progressive state of the airline industry in New Zealand, the CAA acknowledges that other operators not mentioned are also implementing Human Factors

Air New Zealand

- Early adoption of FRMS, SMS, risk management
- LOSA / Threat & Error Management training
- Integrated training (technical and non-technical)
- Data driven / evidence based training
- Command Leadership training
  - Based on LOSA results
  - Focus now on Human Factors
- “Train the trainer”
- Organisational leadership
  - sharing knowledge with other aviation participants
  - involvement in regulatory working groups

Air New Zealand

Train the Trainer

- 2 days training provided to all instructors/examiners
- Focus on Human Factors
- Understanding factors affecting crew performance
- Integrated approach (technical & non-technical)
- Techniques (e.g. facilitate constructive debrief)
- Standardise assessments
- Standards personnel leading by example
- On-going assessment of crew OCA results

Note: this approach aligns well with new Advisory Circular

Jetconnect

- Adoption of SMS
- TEM training (all phases)
  - situational awareness
  - decision making (e.g. go arounds)
- Adoption of ITQI (evidence based training)
- Focus on monitoring & crosschecking
- Technology investment
  - HUD
  - VSD display
  - Nav scales on PFD
  - Predictive windshear


Safety Management System
Training Needs Review
- Competency
- Performance Markers
- Grading
Training
FOQA
LOSA
Reporting
Alert Trends
Just Culture

Pacific Blue Airlines

- Company approach “HF has no boundaries”
  (Flight ops, ground handling, business support, contractors)
- “Safety Snapshot” (LOSA-like observation)

- CRM assessment in simulator
- Revised assessment markers
- NTS training in all operational areas
- Data driven approach to training
- Supportive of IATA event based training
- Investing in external expertise to assist

Pacific Blue Airlines

Threat & Error Management in practice

- Safety Snapshot to validate TEM practice - conducted by Ted Hunkin (LOSA Collaborative)
- Significant threats – airports, terrain, weather
- Ground handling identified as major issue – PB working with handling company to minimise threats
- Although good result, PB maintains strong improvement focus
- Next steps:
  - refine crew training
  - revise company SOPs

Air Nelson

- CRM, TEM training
- Operating philosophy (e.g. roles, decision making)
- Procedures – encourage good CRM behaviours
- Simulator training includes HF (e.g. workload management)
- Simulator includes “mini LOFT” exercise
- Human Factors review by Cranfield University

  → **findings shared with regulator & industry**

  → **adoption of LOSA**

  → **technology investment (second GNSS/FMS)**

RNAV HF REVIEW

conducted by

Cranfield University

Steve Jarvis

B.Ed (hons) M.Sc M.RAeS M.Erg.S

Matt Ebbatson

B.Sc (hons) M.Sc

presented by

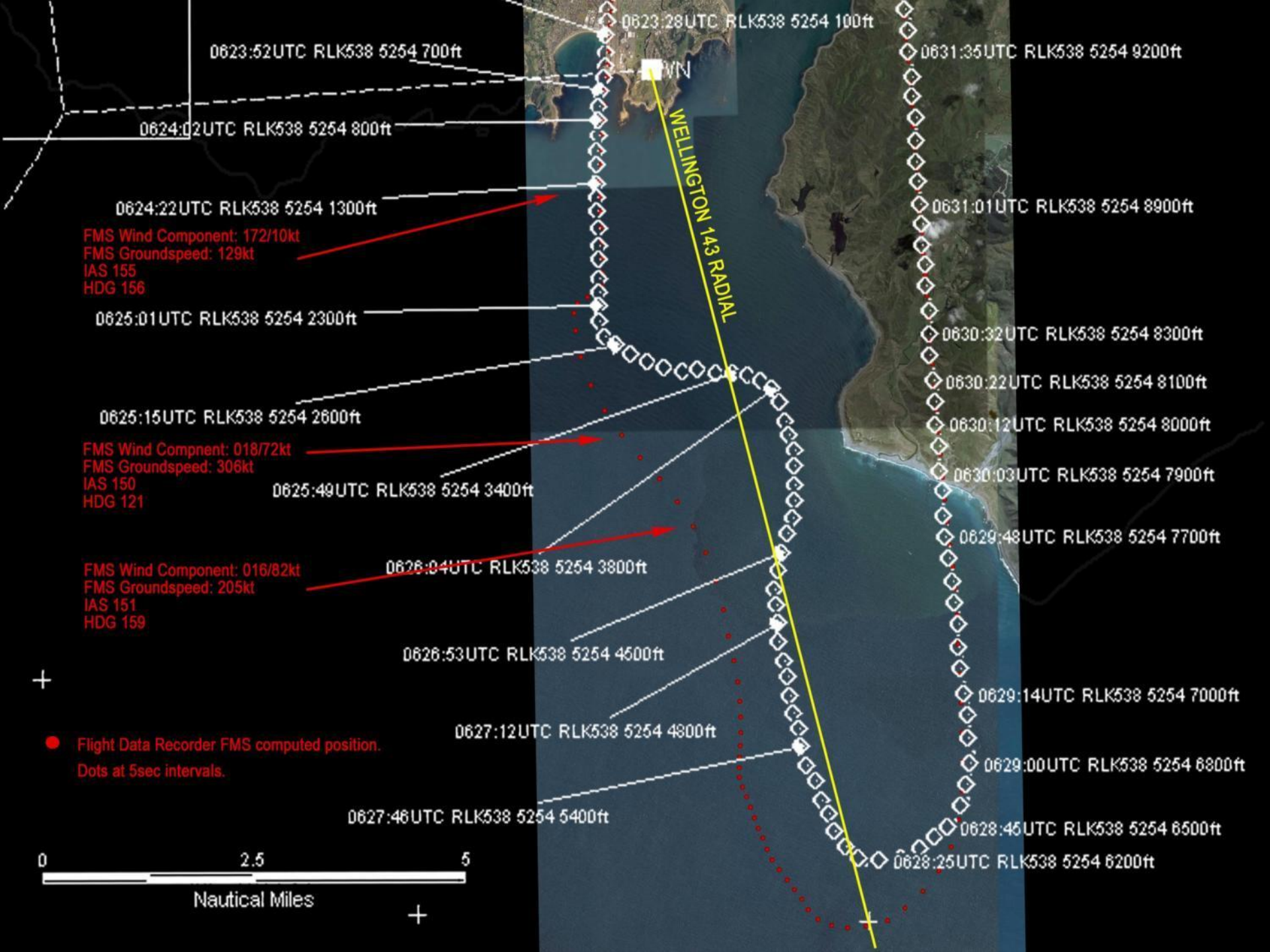
Capt John Martin

The Equipment

- 23 Bombardier Q300 Aircraft
- 60,000 flights per annum
- 200 Pilots

- Universal Avionics Corporation
- UNS - 1E Flight Management System
- Multi – Sensor (GPS, VOR, DME)
- TSO-129

AIRNELSON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WN
0631:35UTC RLK538 5254 9200ft
WELLINGTON 143 RADIAL
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0624:22UTC RLK538 5254 1300ft
0631:01UTC RLK538 5254 8900ft
FMS Wind Component: 172/10kt
FMS Groundspeed: 129kt
IAS 155
HDG 156
0625:01UTC RLK538 5254 2300ft
0630:32UTC RLK538 5254 8300ft
0630:22UTC RLK538 5254 8100ft
0625:15UTC RLK538 5254 2600ft
0630:12UTC RLK538 5254 8000ft
FMS Wind Compnent: 018/72kt
FMS Groundspeed: 306kt
IAS 150
HDG 121
0630:03UTC RLK538 5254 7900ft
0625:49UTC RLK538 5254 3400ft
0629:48UTC RLK538 5254 7700ft
FMS Wind Component: 016/82kt
FMS Groundspeed: 205kt
IAS 151
HDG 159
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0626:53UTC RLK538 5254 4500ft
0629:14UTC RLK538 5254 7000ft
Flight Data Recorder FMS computed position.
Dots at 5sec intervals.
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0629:00UTC RLK538 5254 6800ft
0627:46UTC RLK538 5254 5400ft
0628:45UTC RLK538 5254 6500ft
0628:25UTC RLK538 5254 6200ft
0
2.5
5
Nautical Miles

RNAV HF REVIEW

- Initial (internet) survey of pilots (sample n = 26)
- Brief analysis of the RNAV procedures in relation to general human factors and ergonomics principles.
- Quasi-cognitive-task-analysis interviews with crews.
- Observational sessions on the flight deck
- Simulator training observations

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Where to from here?

CAA RULE Development

(CAR Part 19, Subpart D, IFR Operations: GNSS – 01 April 1997)

NAV AID withdrawal – Airways Modernisation

Procedure Design

Standardisation

Summary

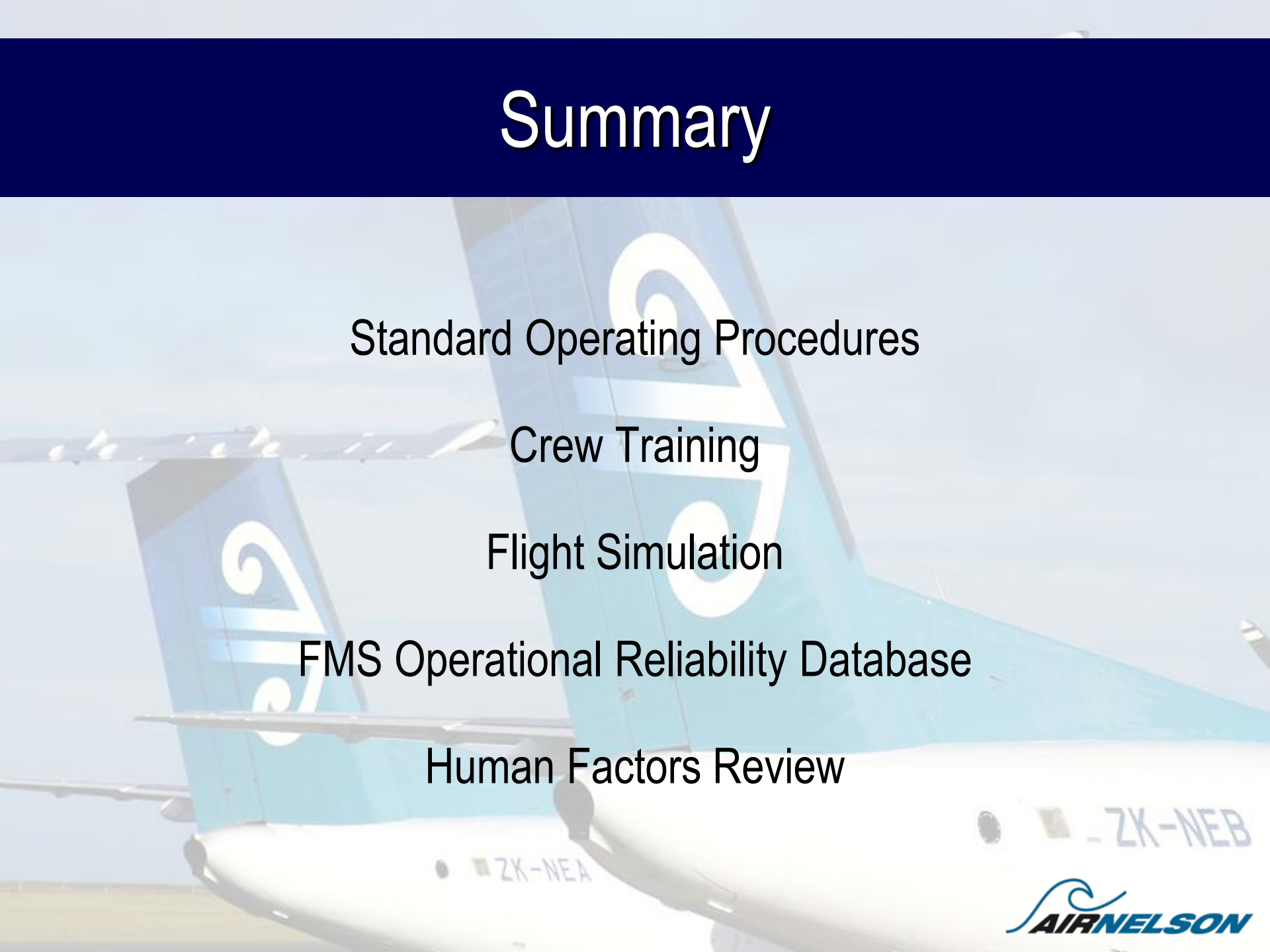
Standard Operating Procedures

Crew Training

Flight Simulation

FMS Operational Reliability Database

Human Factors Review



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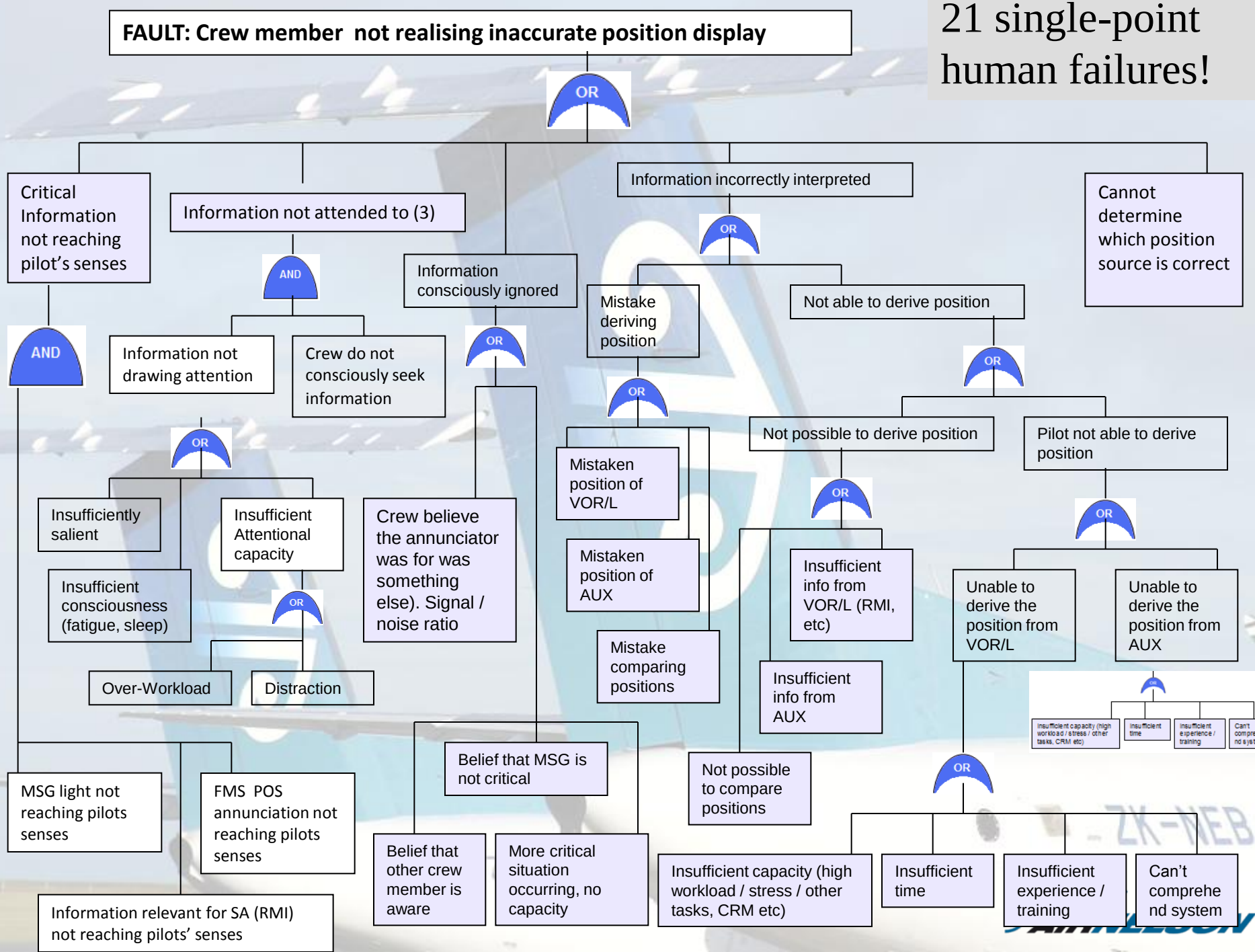
21 single-point human failures!



Desired Future State (NZ)

- Successful SMS Implementation
  - proactive risk management
- Investment in safety initiativ… performance and reduc…
  - procedures
  - training
  - technol…
- S… …mework and skilled FOIs
  - …ty performance
  - …n accidents and major incidents
  - …s effectively mitigated

A shared responsibility

The beneficiaries of our combined efforts

Questions?

Thank you