Threat and Error Management

An Airline Perspective

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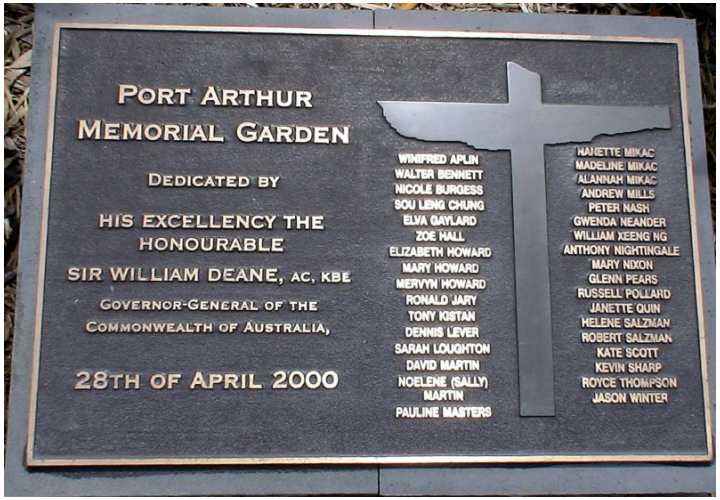
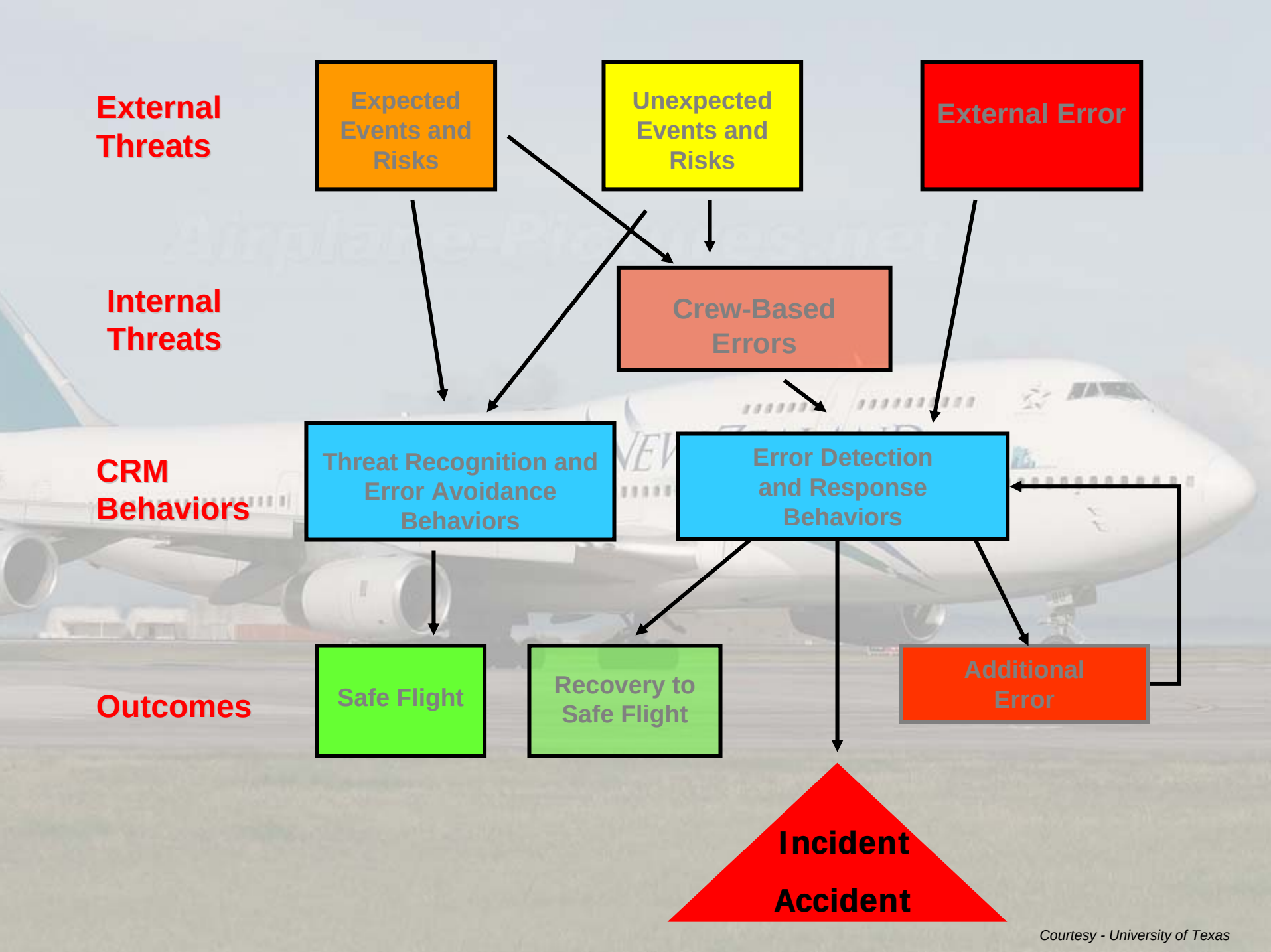
Air New Zealand

AIR NEW ZEALAND
LINK

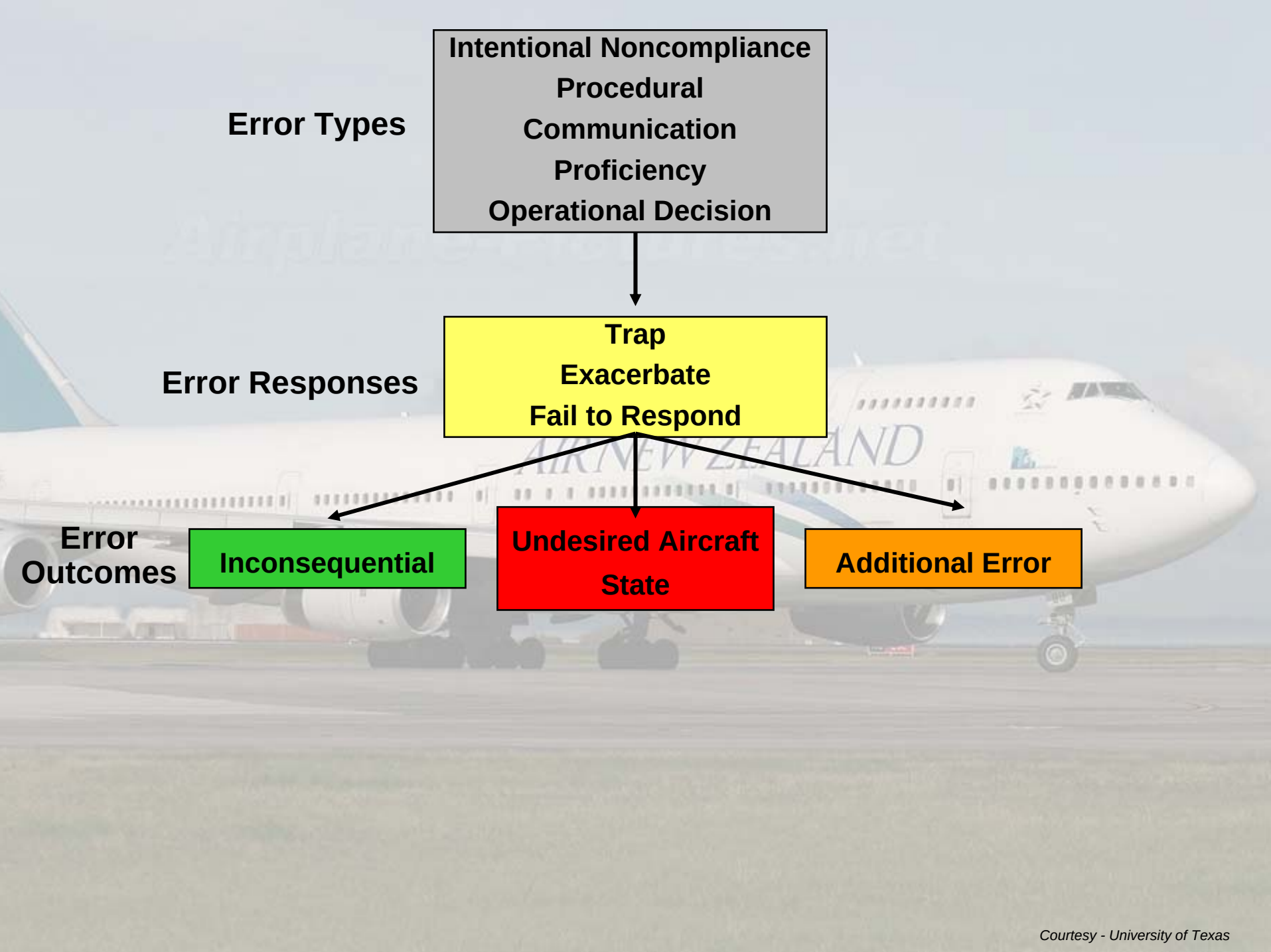


XIVth COMMONWEALTH GAMES
AUCKLAND 1990

University of Texas Team Research Project



Courtesy - University of Texas



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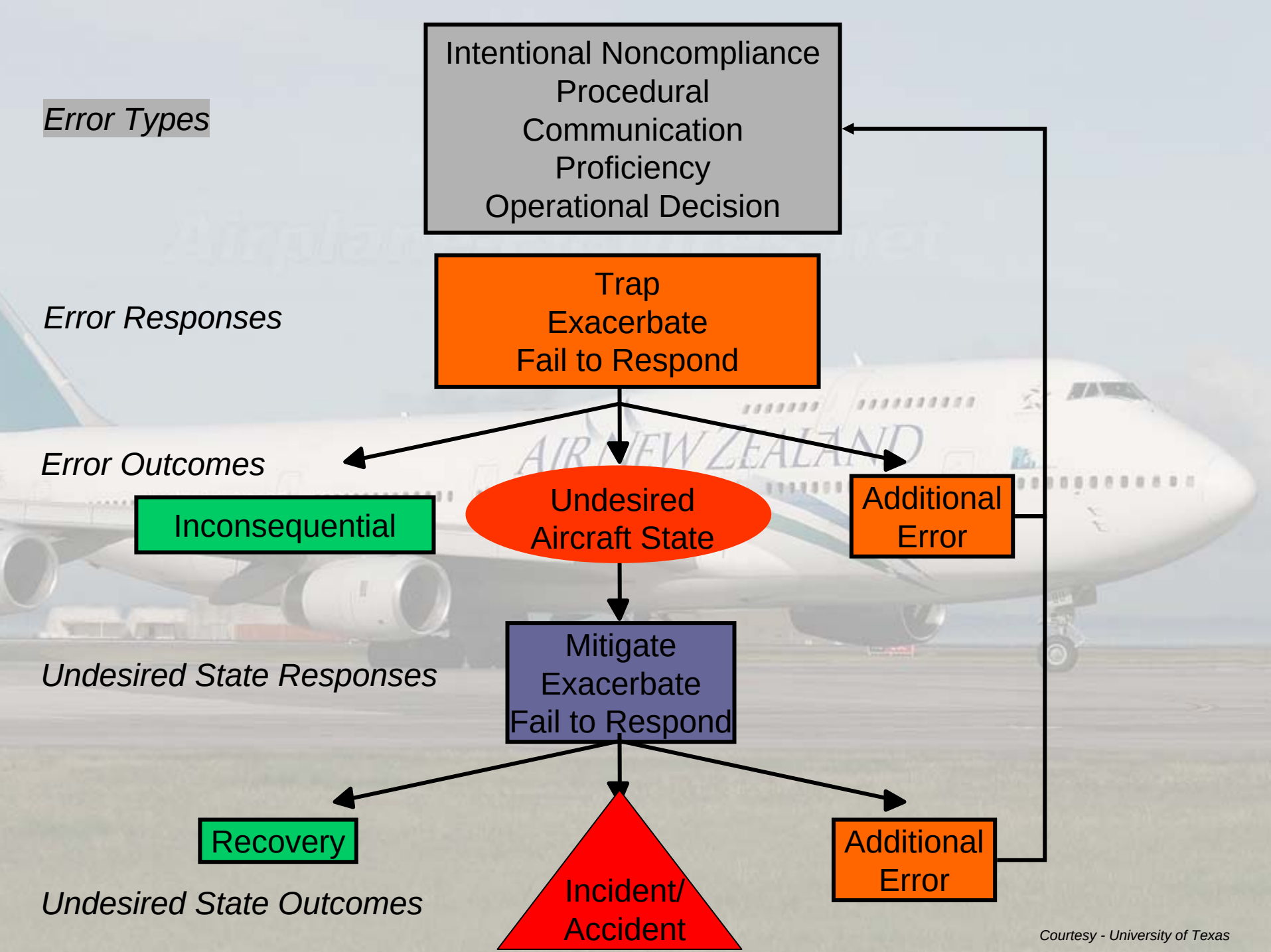
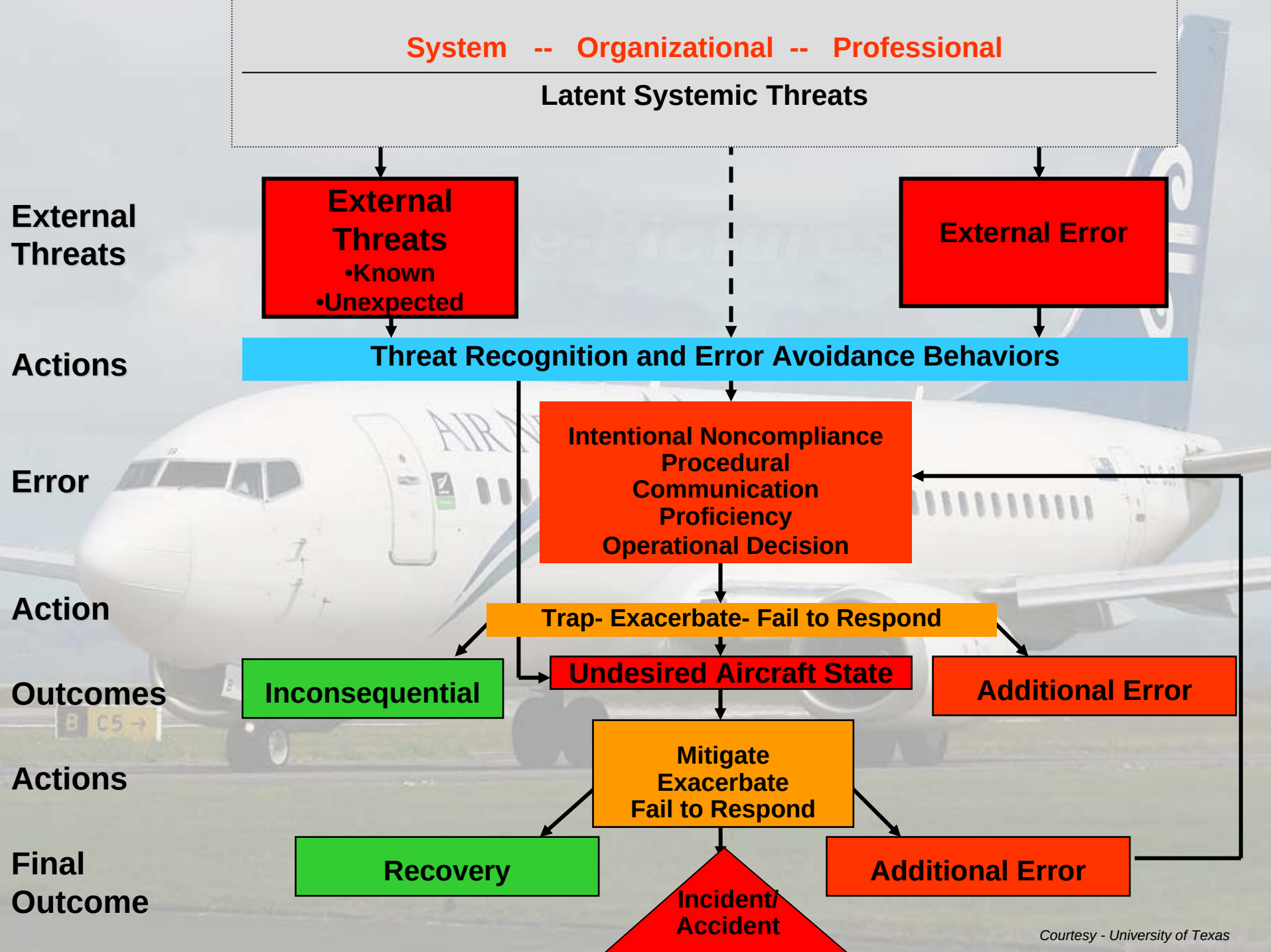

Error Types
Intentional Noncompliance
Procedural
Communication
Proficiency
Operational Decision
Error Responses
Trap
Exacerbate
Fail to Respond
Error Outcomes
Inconsequential
Undesired
Aircraft State
Additional
Error
Undesired State Responses
Mitigate
Exacerbate
Fail to Respond
Recovery
Incident/
Accident
Additional
Error
Undesired State Outcomes
Courtesy - University of Texas

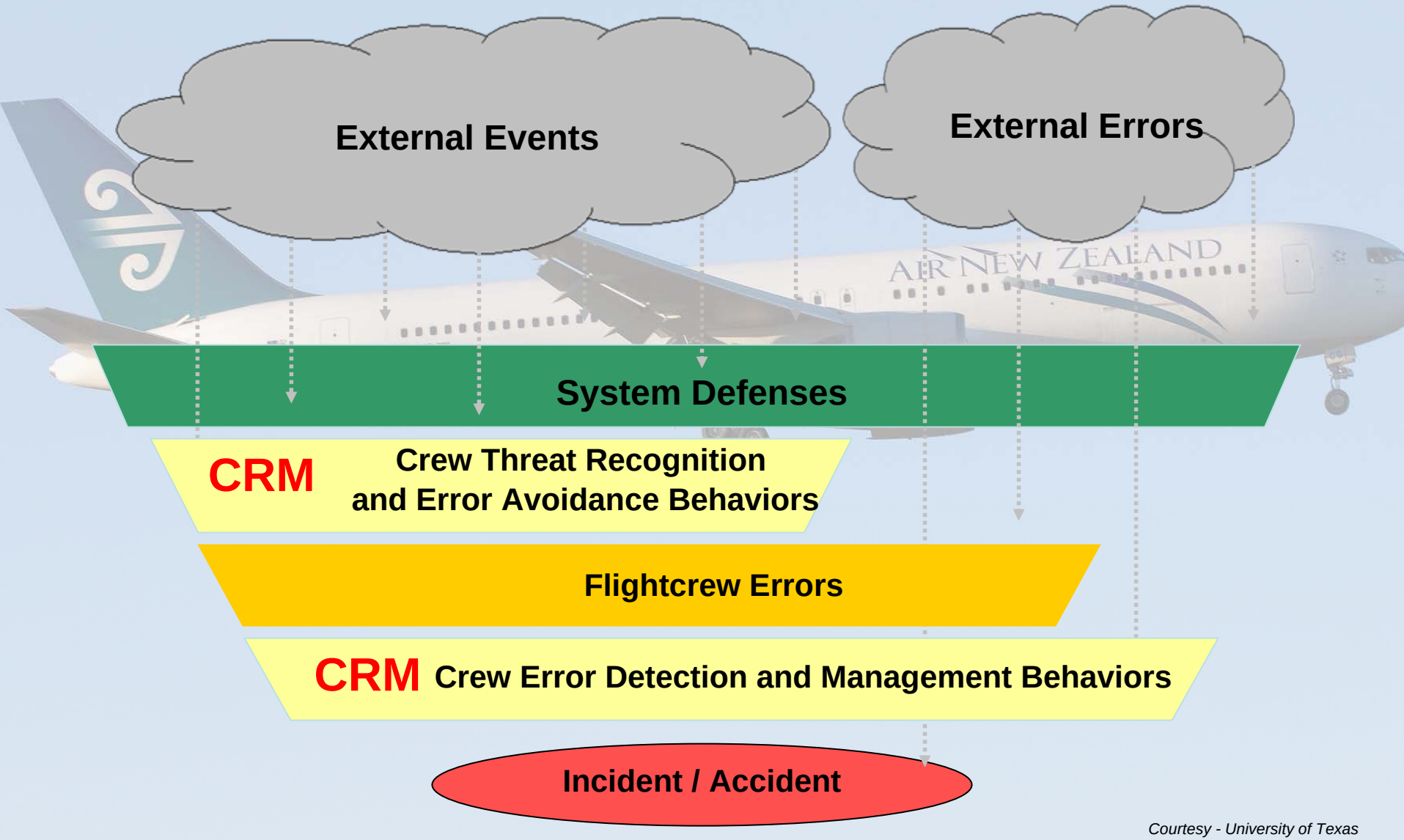

System -- Organizational -- Professional
Latent Systemic Threats
External Threats
External Threats
•Known
•Unexpected
External Error
Actions
Threat Recognition and Error Avoidance Behaviors
Error
Intentional Noncompliance
Procedural
Communication
Proficiency
Operational Decision
Action
Trap- Exacerbate- Fail to Respond
Outcomes
Inconsequential
Undesired Aircraft State
Additional Error
Actions
Mitigate
Exacerbate
Fail to Respond
Final Outcome
Recovery
Incident/ Accident
Additional Error
Courtesy - University of Texas

AIR NEW ZEALAND

THREAT & ERROR MANAGEMENT

(TEM)

The Rain of Threat and Error



Courtesy - University of Texas

The Concept of the “PRISTINE” Flight

What is it?

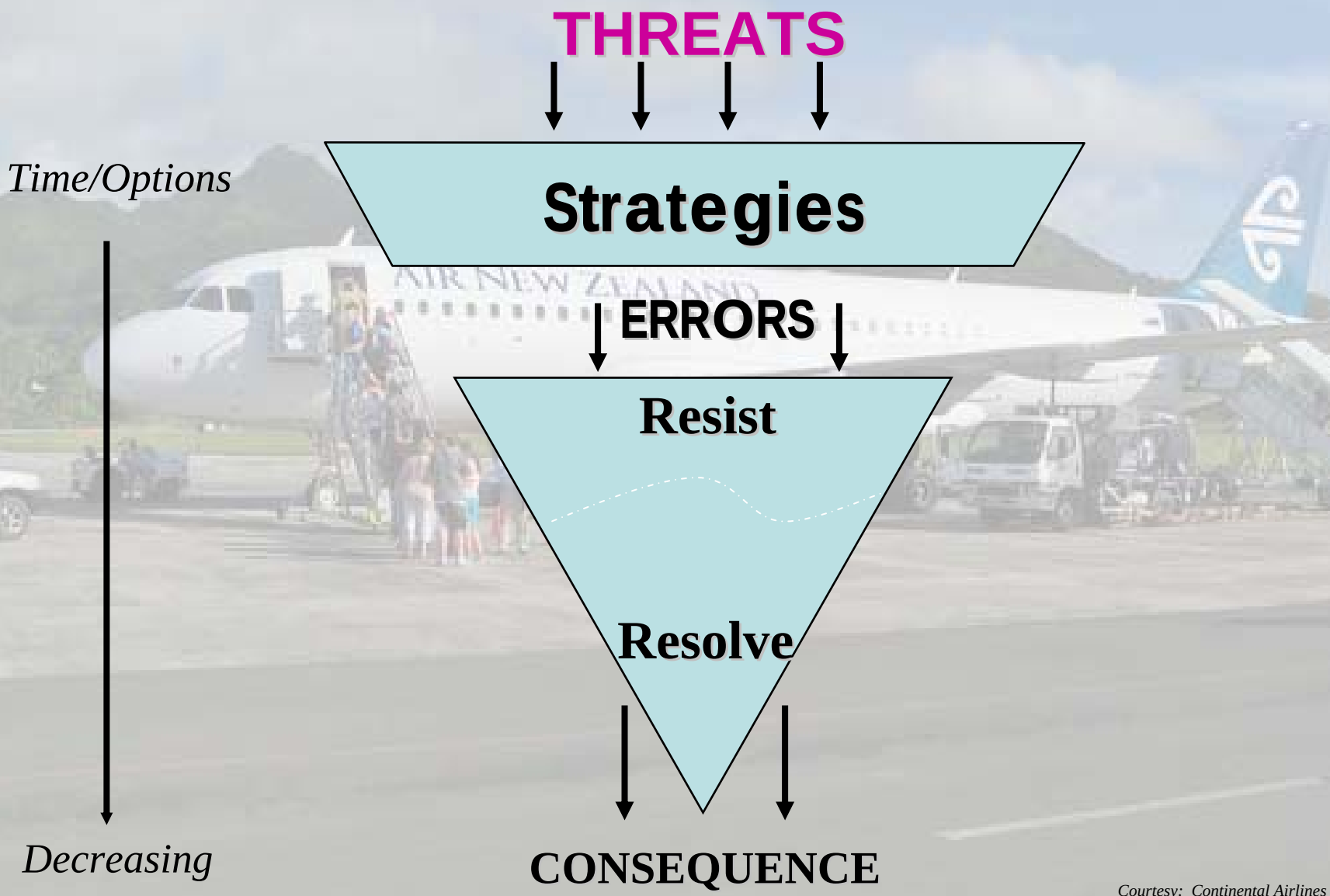
- ✓ A flight where nothing goes wrong
- ✓ A flight goes entirely as planned
  - ✧ good weather
  - ✧ no delays
  - ✧ no fatigue
  - ✧ no passenger demands
  - ✧ nothing out of the ordinary
  - ✧ “boring!!”
- ➔ Does it ever happen ???

Courtesy – Continental Airlines

What is a threat?

Anything that causes a variation to a Pristine Flight

TEM Model



Courtesy: Continental Airlines

TEM Principles

- **Recognition of threats**
- **Threat management strategies**
  - *Verbalisation*
  - *Prioritise – flying, deal with threat*
  - *Planning, briefing, SA reviews*
- **Error trapping**
  - *SOPs, Vol 1 procedures adherence*
  - *Checklists – what am I checking? SA reviews*
- **Error Management**
  - *Immediate actions & Error review*
- **Creating right environment**
  - *Open communication & Encourage feedback*
  - *Setting standards*

Threat and Error Management

THREATS:

- **Baro VNAV - QNH setting**
- **Radar vectors:**
  - **– vertical mode?**
  - **– MCP altitude window?**
- **TOGA to LNAV**

Route Guide example - SYD

WARNING

AIR TRAFFIC CONTROL

* **Air Navigation Regulations apply, which include the use of specific arrival and departure corridors - refer Jeppesen for details.**

ADVERSE CONDITIONS

* **Visibility reduces in fog (autumn, winter, and spring), and with dust in North-west winds.**
* **Turbulence can be severe in South-west winds, and strong North-west winds, on hot days.**

CAUTION

* **Large flocks of birds in vicinity of aerodrome.**
* **Stringent noise abatement procedures apply - refer Jeppesen for details.**
* **During arrivals, aircraft must fly within - and not deviate from - designated flight corridor, except when instructed or approved by ATC for safety reasons.**
* **Extensive holding can occur during peak periods. When a delay of more than 5 minutes is expected, ATC will advise expected landing, delay, or onwards clearance time as appropriate.**
* **ILS PRM Approaches:**
* **Air NZ approved, provided the Captain and First Officer have successfully completed the Precision Runway Monitor training package.**
* **Descent/Approach brief must include reference to Jeppesen Terminal Sydney 'ILS PRM USER INSTRUCTIONS' page.**
* **Ensure 'PRM' ILS approach chart is used, as opposed to standard ILS chart.**
* **Simultaneous Close Parallel RWY operations may be in force. Refer Jeppesen SYD pages for procedures and terminology. Aircraft up to and including B767/A300 size may be processed to land on either of the parallel RWYs 16L/R or 34L/R.**
* **TCAS RA's may be experienced during parallel RWY operations. Consider using TA Only Mode. Refer to SOPs.**
* **Aircraft which operationally require to use either 16R or 34L should notify ATC prior to TOD.**
* **Go-around procedures from a visual approach in VMC must follow the instrument procedure for the primary instrument approach for that RWY, or proceed as directed by ATC.**

Route Guide example - SYD

THREATS

General

***Obstacle.** There is one significant obstacle in the vicinity of the airport.
***B777-300.** Ground restrictions may apply. Refer Jepp airport pages.

Arrival Specific

***ATC.** During arrivals, aircraft must not deviate outside designated flight corridors, except when instructed or approved by ATC for safety reasons.
***Navigation**: ILS PRM approaches:
*Air New Zealand approved, provided the captain and first officer have successfully completed the Precision Runway Monitor training package.
*Descent/Approach brief must include reference to Jeppesen Terminal Sydney ILS PRM USER INSTRUCTIONS' page.
*Ensure 'PRM' ILS approach chart is used, as opposed to standard ILS chart.
***Parallel runway operations**. Simultaneous close parallel runway operations may be in force. Refer Jeppesen SYD pages for procedures and terminology. Aircraft up to and including B767/A300 size may be processed to land on either of the parallel runways 16L/R or 34L/R.
***Unstable ILS Indications – Runway 16R.** Aircraft taxiing in the vicinity of the GS antenna, located inside the main taxiway, may cause unexpected pitch downs and associated GS fail flag for aircraft on approach.
***VMC go-around**. Go around procedures from a visual approach in VMC must follow the instrument procedure for the primary instrument approach for that runway, or proceed as directed by ATC.

Departure Specific

***Taxiway restrictions.** Numerous TWY restrictions apply.

Other examples

Another threat that exists during pre-flight and able to manifest itself later as a take-off configuration warning is highlighted below. We can also manage this threat by carefully and correctly stowing the Speed Brake lever after landing.

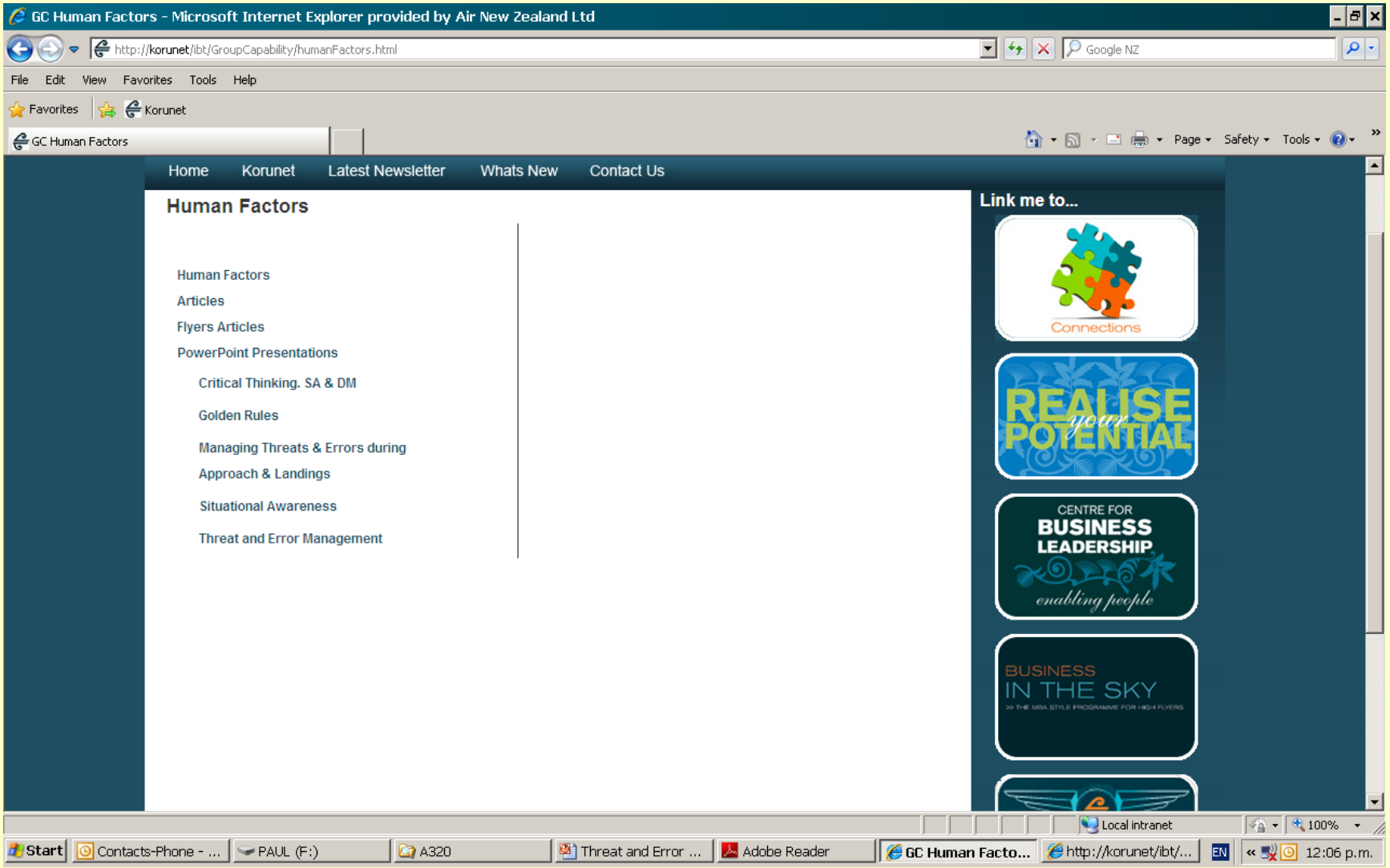
*SPEED BRAKE lever ..... DOWN deten

To ensure the speed brake is properly stowed, push down firmly on top of the speed brake.

*Reverse thrust levers ..... Down

*Forward thrust levers Closed

Other examples



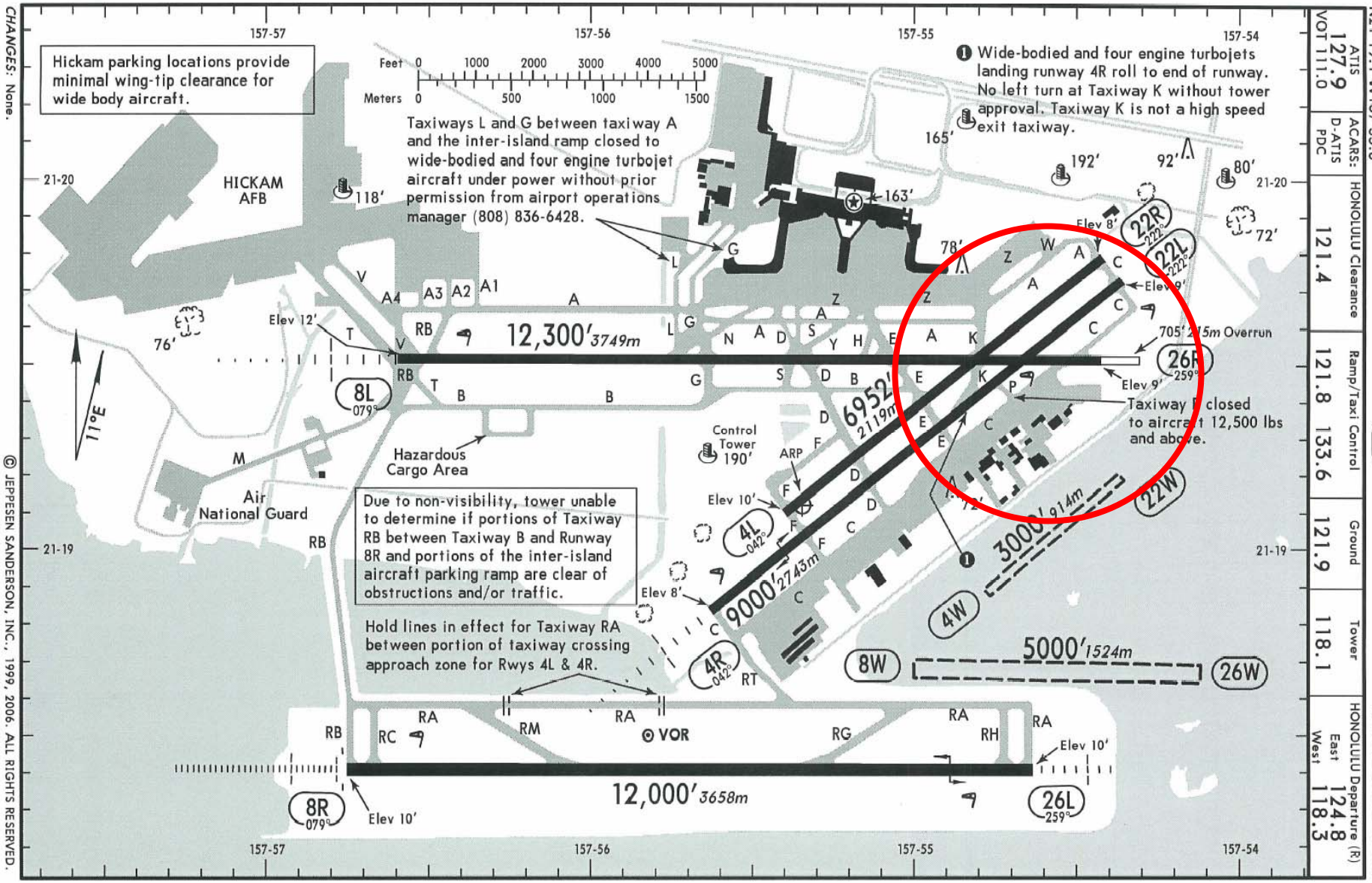
Other examples

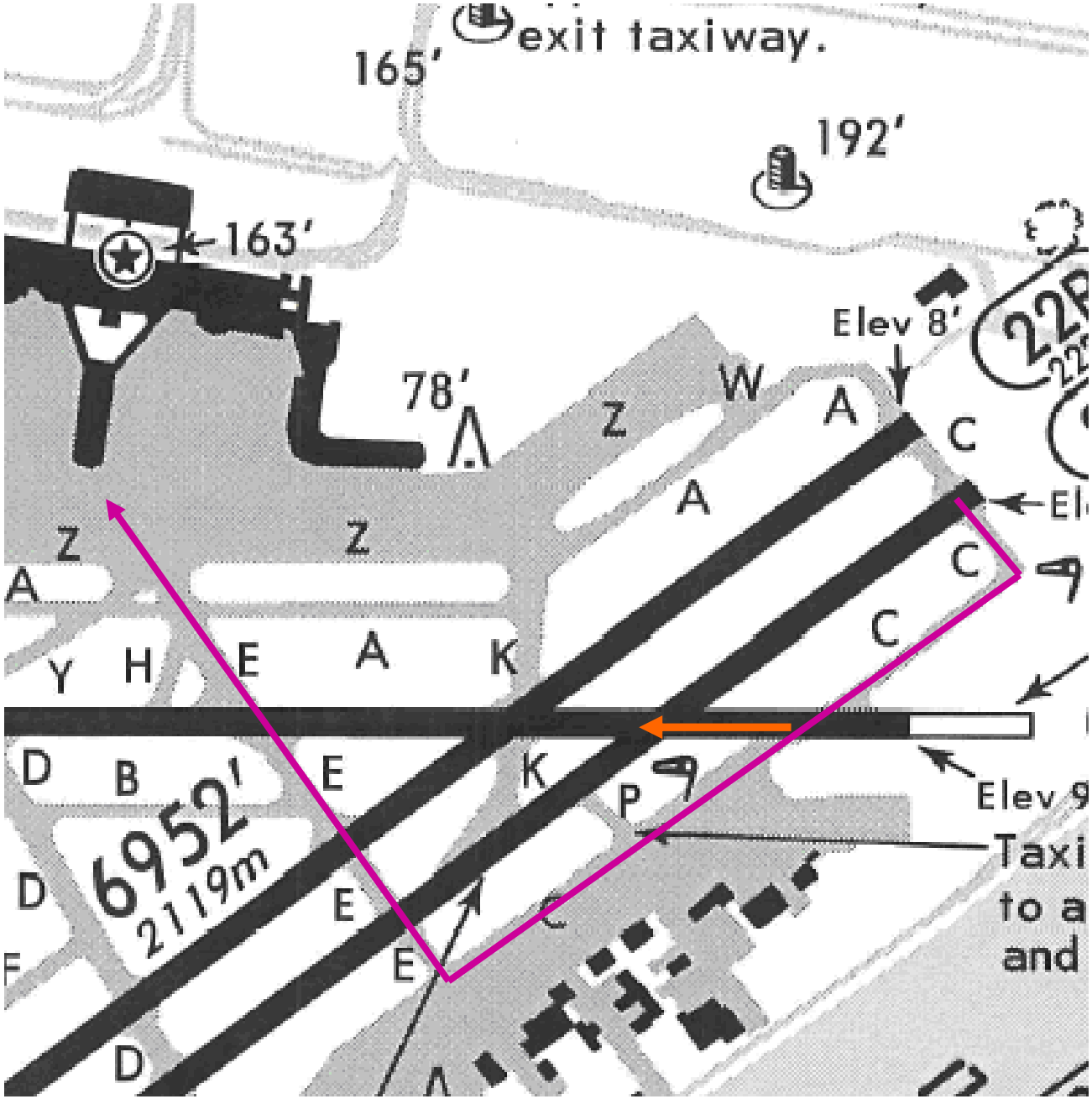
Realistic communication scenarios are to be introduced - this means that the Instructor may interrupt briefings or procedures at any stage to pass on instructions or information. This provides realism and highlights the need for Threat and Error management skills. ***B737 Flight Instructor Guide***

Inclusion of 15 minute Human Factors module focussing on TEM during 6 monthly recurrent simulator training.

It is important we learn from our human factor based events, especially the identification of the types of errors and any conditions surrounding the error/s. ***KORUSAFE*** ***(AIR NEW ZEALAND FLIGHT SAFETY MAGAZINE)***

Foremost in the development of joint and focussed recurrent training during Emergency Procedures day.




exit taxiway.
165'
192'
163'
78'
Elev 8'
W
A
Z
C
A
Z
Z
A
C
C
Y
H
E
A
K
D
B
E
K
P
6952'
2119m
D
E
E
D
Elev 9
Taxi
to a
and

Threat Management
There were a number of threats the crew were faced with and had to manage, namely:

1. ***The work in progress at the end of 4L.***

2. ***A different taxi route to the terminal when leaving runway 4R than the crew had previously been accustomed to.***

3. Night time operation with the lack of signage and lighting on taxiway 'C' on the southern side of runway 8L.

4. Jeppesen Ground Chart for HNL Airport.

Recommendations

1. It is recommended that the Manager Human Factors uses this event along with the following points for discussion in future recurrent flight crew CRM training:

Distraction management; while trying to look for the taxiway lights on the other side of runway 8L the crew allowed themselves to become distracted by the Aloha B737 aircraft on the runway.

The use of ATC as a mitigation measure; if the ground controller had been queried about the status of the lights and the offset on the other side of 08L, the flight crew would have been given the information enabling a better management of the threat.

Language; the ground controller gave the instruction to cross runway 8L very quickly (this is a common practice and is familiar to all crews that operate to the US). While the clearance was discussed among the crew and the correct route identified, part of the clearance was misinterpreted.