



Dr Claude Preitner

Senior Medical Officer

Civil Aviation Authority of NZ

Air Accidents 101 - Concurrent Workshop

Saturday, 11 June 2011

Start 4:30pm

Duration: 60mins

Picasso

 **Rotorua GP CME 2011**
New Zealand Medical Association

General Practice Conference & Medical Exhibition



09-12 June 2011 | Energy Events Centre | Rotorua

Air Accidents



Lessons for Medical Practitioners

Claude Preitner (FRNZCGP)
Senior Medical Officer CAA

Why this topic ?

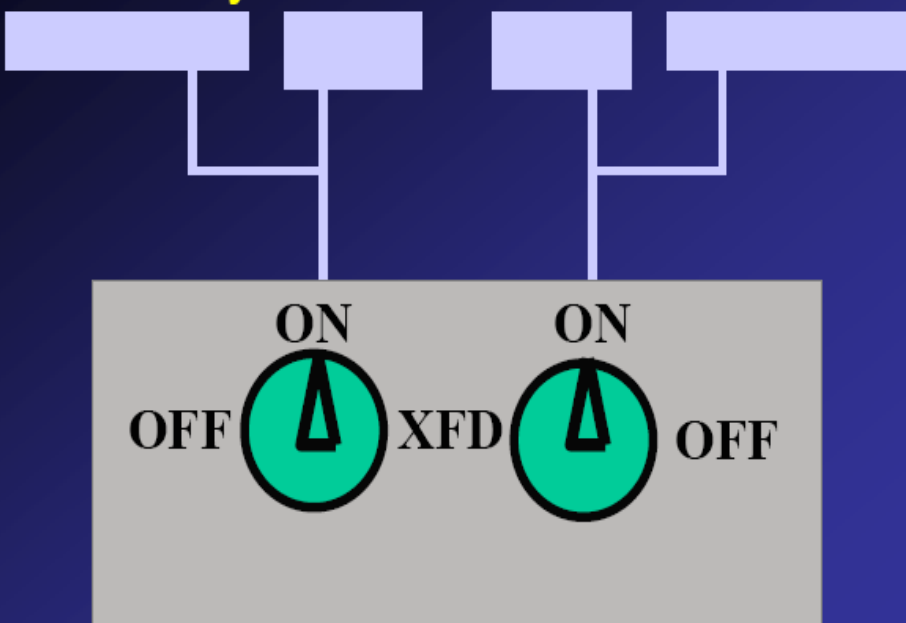
- Aviation : 80 % of accidents / incidents due to human factors
- Nuclear: 70 % of accidents / incidents due to human factors
- Shipping: 75 % of accidents / incidents due to human factors
- Medicine: 70 % of accidents / incidents due to **human factors**

Some stats

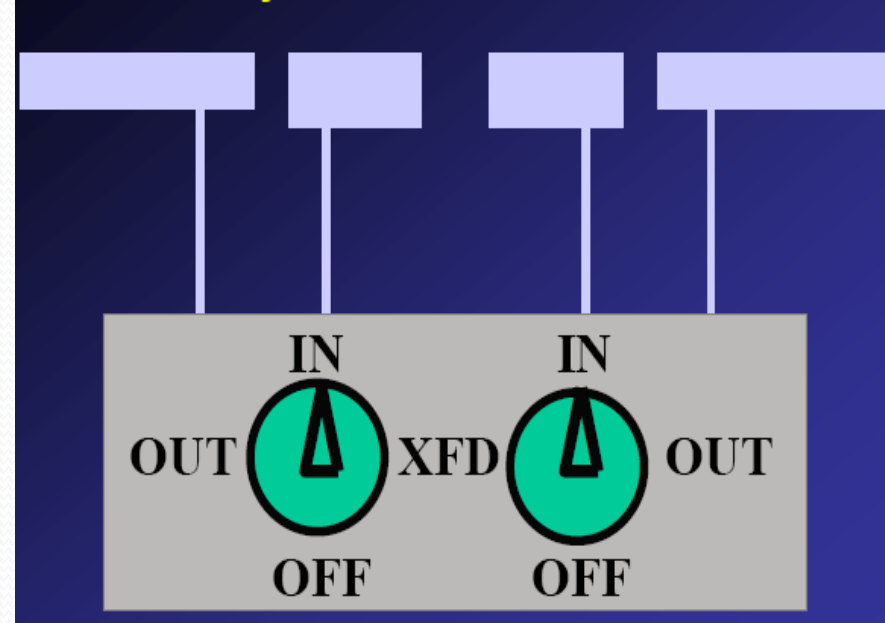
- Between 1995 and 2008: 1,429 airline accidents in the world. 431 occurred during takeoff or landing
- Pilot error or poorly designed runways were often cited as the causes of crashes
- The ICAO: Factors such as airport design and construction, air traffic control, air traffic management systems and processes, airline operations, flight crew awareness and communications
- In 2009, the number of crashes started to fall after the ICAO and IATA released new runway operation safety guidelines.



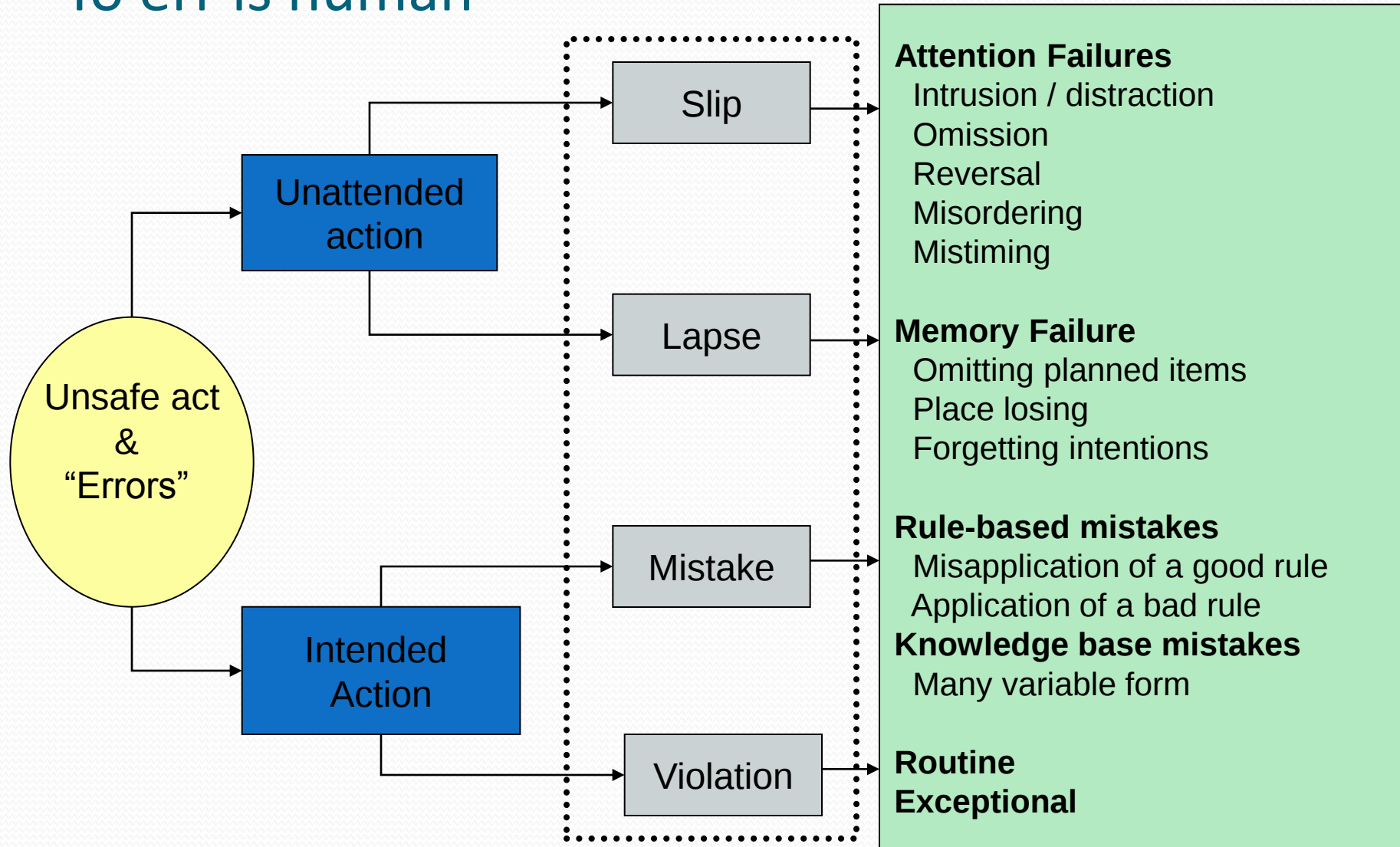
Fuel System: ZK-TAK



Fuel System: ZK-TIK



Errare humanum est “To err is human”



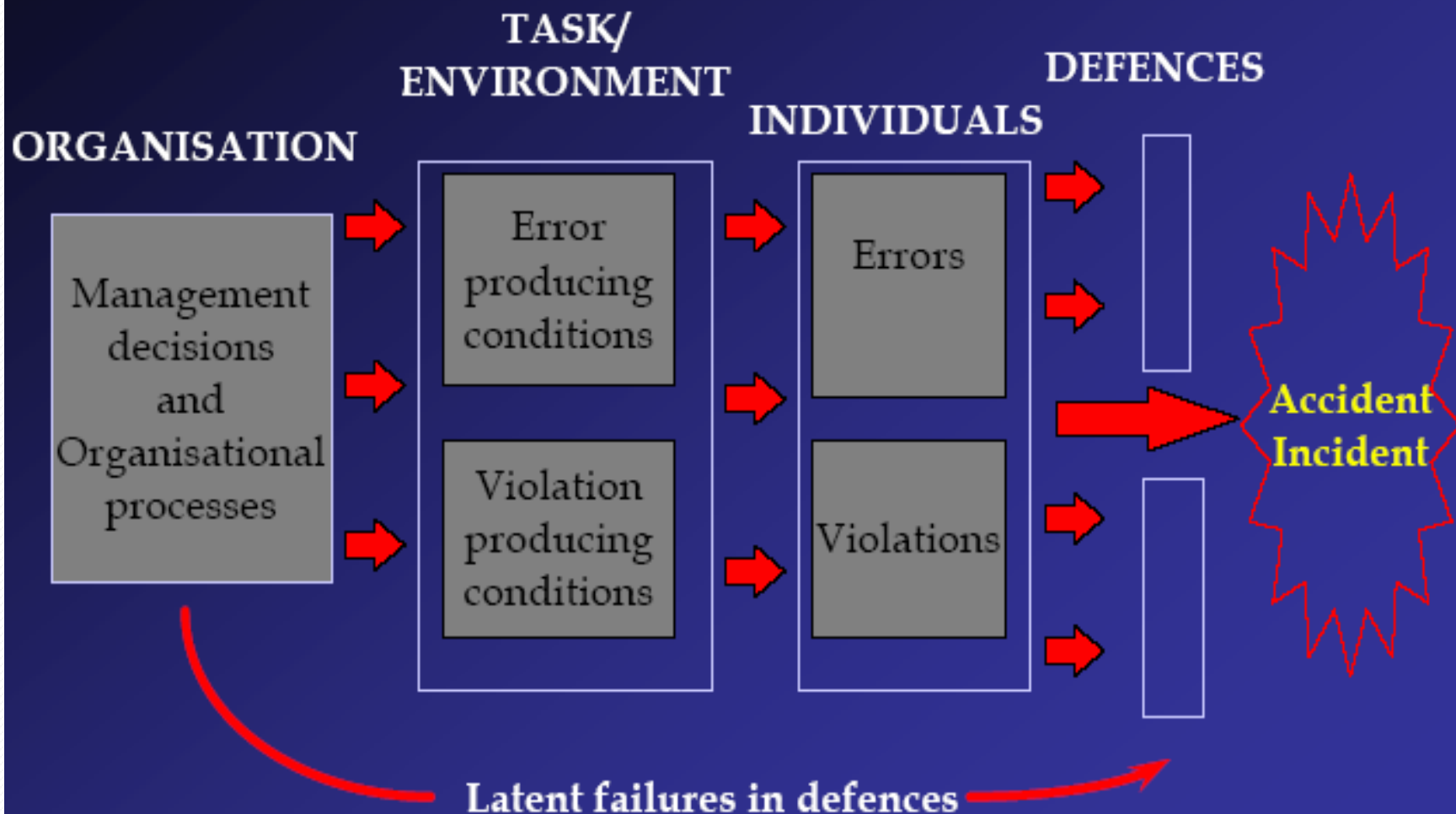
Latent failure

- Present in the system before the onset of an identifiable incident or accident.
- Latent failure + other factor → brake down in the defence system → incident or accident.

Active failure

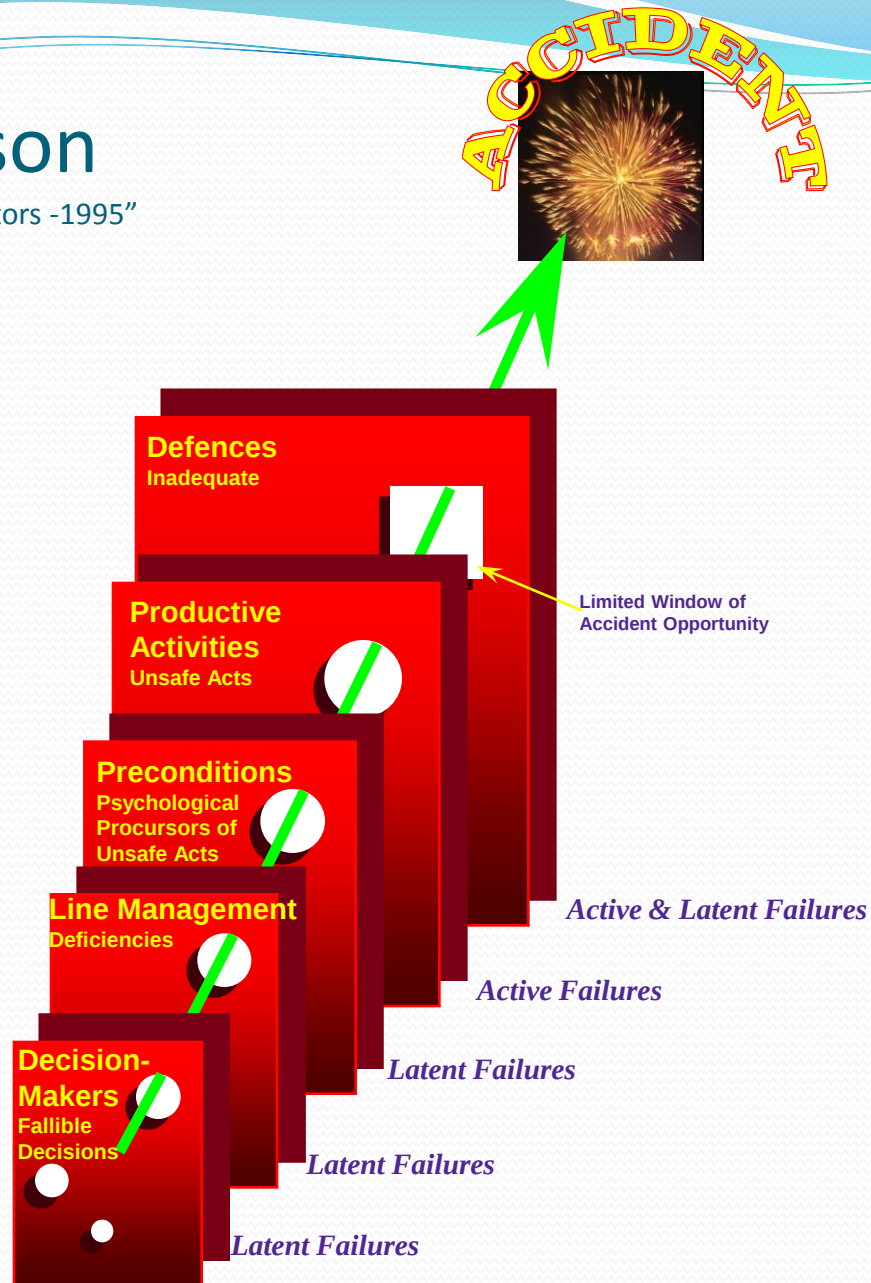
- Unsafe act or error committed by those at the “sharp end” of the system
- Immediate adverse consequences

Anatomy of an Organisational Accident (as per Reason)



James Reason

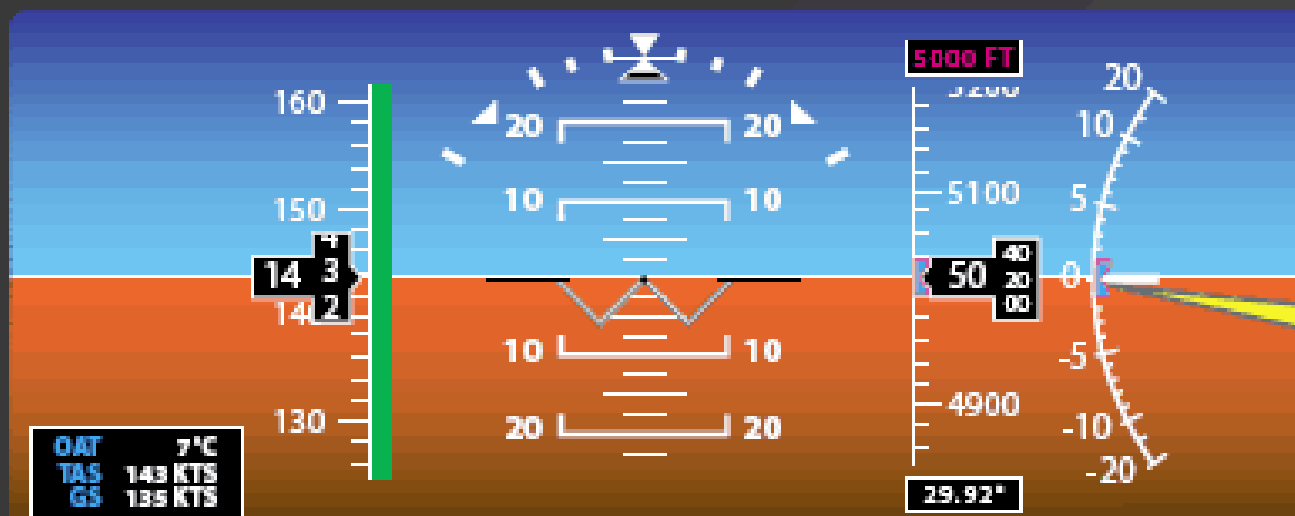
"Beyond Aviation Human Factors -1995"



Error producing conditions

- Fatigue, monotony
- Hostile environment
- Unfamiliarity with task (training / experience)
- Time shortage (emergency, theatre)
- Information overload
- Designer-user mismatch
- Negative transfer between task
- Poor feed back from system (alarm)
- Poor instructions and procedures
- Misperception of hazard
 - Don't know what we don't know





Nav
GPS1

BDL
BRG 264°
32.8 NM
00:14:34

Bearing
GPS2

KHPN
BRG 234°
96.4nm
00:42:50

Aux
OFF

Range
View

Range — View



Hdg Bug
270°

Alt Bug
5000 FT

VSI Bug
0 FPM

Baro Set
29.92"

Hdg — Sync

Vertical speed
indicator

Heading

Altitude

Vertical speed
selection

Altimeter setting

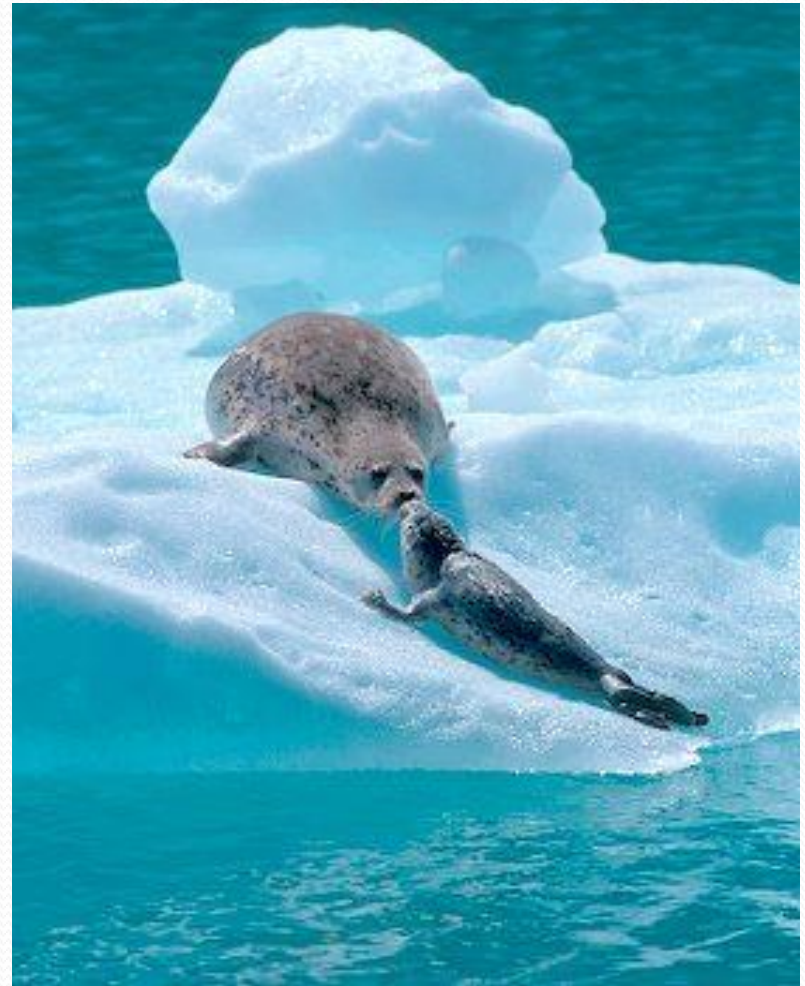
Violation producing conditions

- Lack of safety culture within organisation
- Conflict with management
- Poor morale
- Low self esteem and pride in job
- Poor supervision
- Misperception of hazard
- Perceived lack of concern by management
- Bad rules (Ambiguous, meaningless or excessive)

Avoiding Errors and Mishaps



Accident / incident pyramid



A “systems approach” to incidents - accidents

No blame , No shame!

- Consider failures as “system failures”
- Failures are not uncommon
- Failures rarely occur as the result of a single action or error
- Some of the failures are already in the system (passive failures)

Error avoidance strategy

- Actual outcome is irrelevant
- Potential outcome is relevant

→ identify all incidents

→ report all incidents

Confidential / No blame !

Just culture

- Human error is inevitable
- Incidents / accidents are the result of both active and latent failures (systems failures)
- In a “just culture” only certain violations are punishable – irrespective of outcome
- Information gathering is the proactive defence available to identify and manage error and violations
 - User friendly reporting system
 - Foster a safety reporting culture
 - Investigate reported incidents

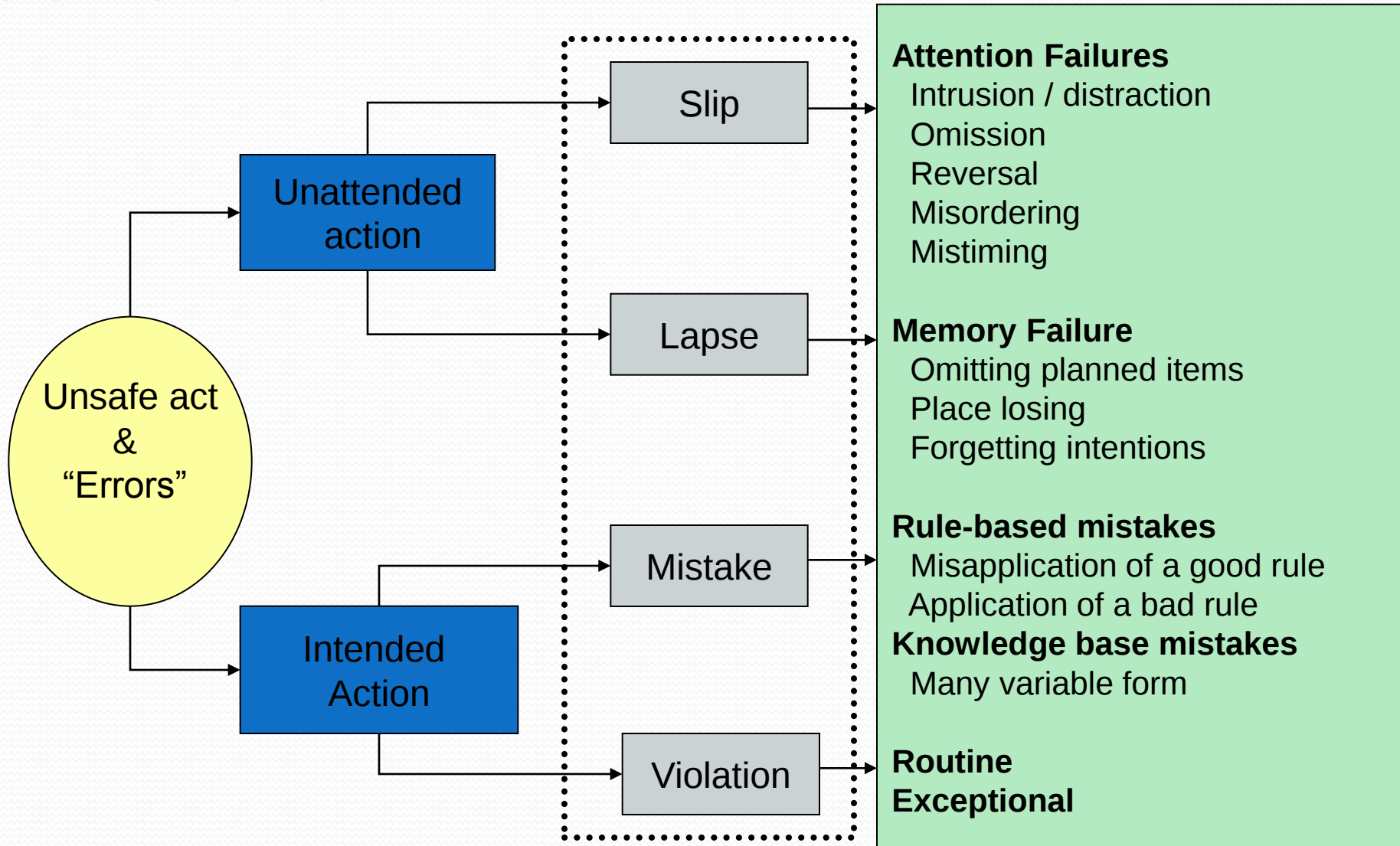


Active failure: TAIC report

- Not ensuring the aircraft intercepted and maintained the approach profile
- Perseverance with his decision to get the undercarriage lowered without discontinuing the instrument approach, **distraction** from the primary task of flying the aircraft safely during the first officer's endeavours to correct an undercarriage malfunction,
- Not executing a Quick Reference Handbook procedure in the correct sequence,
- The shortness of the ground proximity warning system warning. (Defense mechanism)

Errare humanum est

“To err is human”



DASH-8

- **Landing Gear Alternate Release Door**
 - Open fully and leave open
- **Main Gear Release Handle**
 - Pull fully down
- **Landing Gear Alternate Extension Door**
 - Open fully and leave open
- **Insert pump handle and...**

What usually goes wrong?

- Planning and anticipation under stress
 - ACLS training / Know your equipment
- Teamwork and decision making
 - Training / practice scenarios
- Communication and co-operations
 - Training / practice scenarios

Crew Resource Management

- NASA workshop in 1979
- Inability of aircrew to respond to some situations
- CRM training initiated by United Airlines in 1980



What is CRM

- “Using all available resources – information, equipment and people to achieve safe and efficient
 - Flight operations” (Lauber - NTSB)
 - Medical care
- Address the role of human factors in high stress, high risk environment → effectiveness

CRM

- Leadership
 - Conflict resolution
 - Communication
 - Team behaviour
 - Attitude
- Stress
 - Situation awareness (distraction, boredom, stress, fatigue) → sharing information
 - **Breaking error chain**

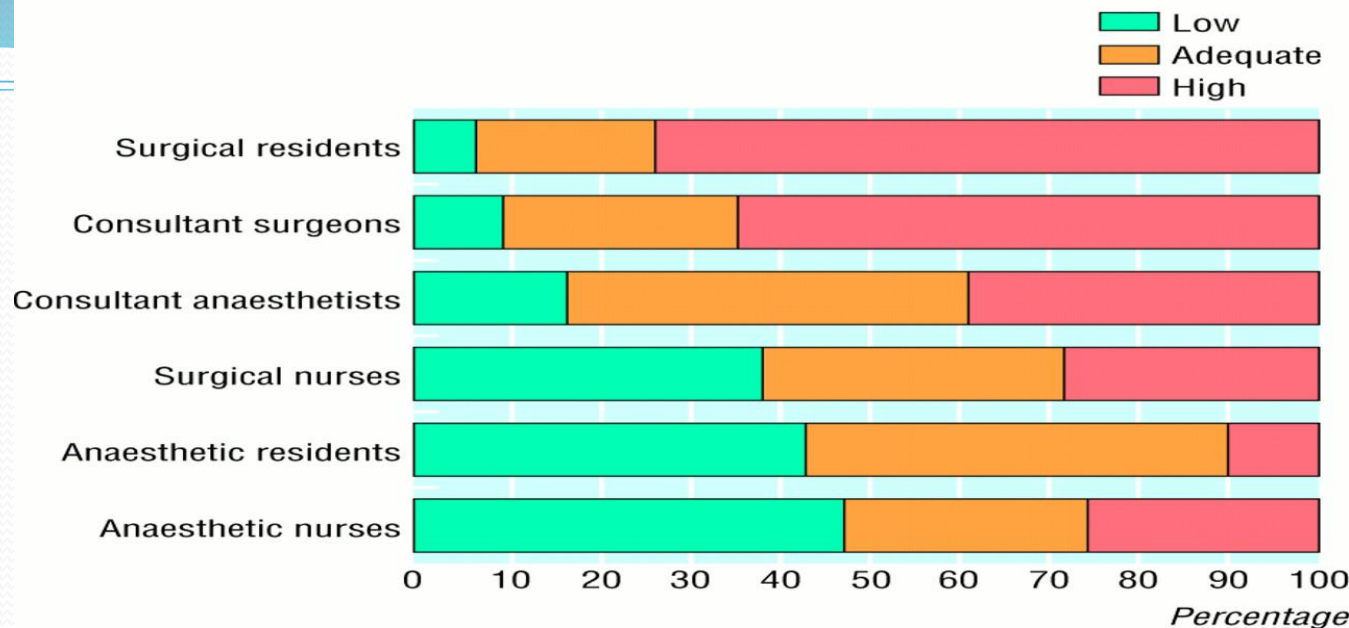
CRM in medical care

Saxton and al BMJ 2000

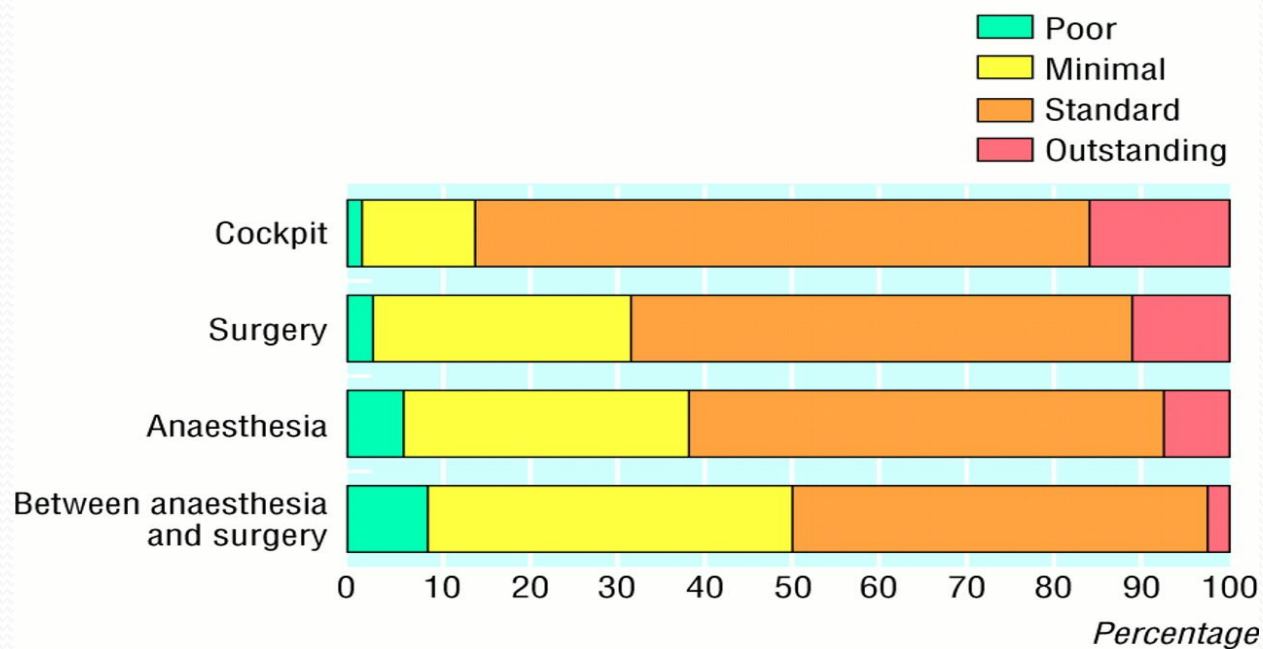
- Team work ? :

● Surgeons	64 %	good team work
● Surgical residents	73 %	
● Anaesthetists	39 %	
● Anaesthetic nurses	25 %	
● Anaesthetic residents	10 %	
● Theatre nurses	28 %	

Self rating of Team work



Trained observer rating



Hierarchy

- Reject steep hierarchy for good CRM
 - Airline crew 94 % Do
 - Surgeons 55 % Do

CRM and medical care

- CRM type of courses developed
 - Anaesthesia crisis resource management CRM training
 - Palo Alto
 - Several others
 - Appropriate for theatre work, intensive care, Emergency Department, ? General Practice
 - Effectiveness: Still debated, mostly well rated by participants.

Fatigue DC 9 - USA



Fatigue

- “Even when fatigued I perform effectively during critical times” – agree:
 - Surgeons 70 %
 - Surgical residents 56 %
 - Surgical nurses 60 %
 - Airline pilots 26 %
(40 % at beginning of study)

Human Factors in Aviation:

Cali Air Disaster

AA965 B757 21DEC95



- Classic case of “human error” complicated by sleep deprivation.
- Programmed autopilot to lock on to “Romeo” beacon instead of “Rozo.”
 - Caused slow turn into a mountain.
 - 150 killed.
- Cockpit voice recorder captured crew complaints of excessive fatigue, yawning, etc.

Take Home Message

- Accidents / incidents are multifactorial
- Involve systemic / latent failures
- Management with safety culture, eliminate latent failures (i.e. Cornerstone accreditation)
- Report and analyse all incidents
- Crew resource management to avoid errors at the “sharp end” of the system – reduce active failures, improve effectiveness.



Questions ?

