

# Industry Day – Rome 27th May 2016

SMS implementation in Airworthiness Organisations



*Cengiz Turkoglu*

Lecturer & Researcher @

*Cranfield*  
UNIVERSITY

Chair of the Technical Comm.



Vice Chairman



Ex-Communication TF Leader

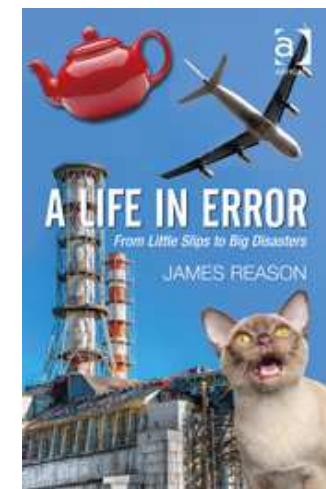
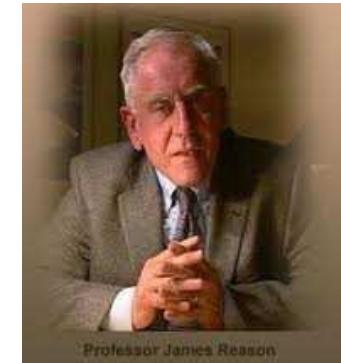


Disclaimer: Unless clearly cited and referenced, all views presented in the following slides are my opinion and not necessarily reflect the views of any of the organisations I am involved in or associated with or work for.

# HUMAN ERROR (STILL A CHALLENGE)



# HUMAN ERROR (STILL A CHALLENGE)



*"The journey begins with a bizarre absent-minded action slip committed by Professor Reason in the early 1970s - putting cat food into the teapot - and continues up to the present day."*

Source: [https://www.amazon.ca/Life-Error-Little-Slips-Disasters/dp/1472418417/175-9532292-4801809?ie=UTF8&\\*Version\\*=1&\\*entries\\*=0](https://www.amazon.ca/Life-Error-Little-Slips-Disasters/dp/1472418417/175-9532292-4801809?ie=UTF8&*Version*=1&*entries*=0)

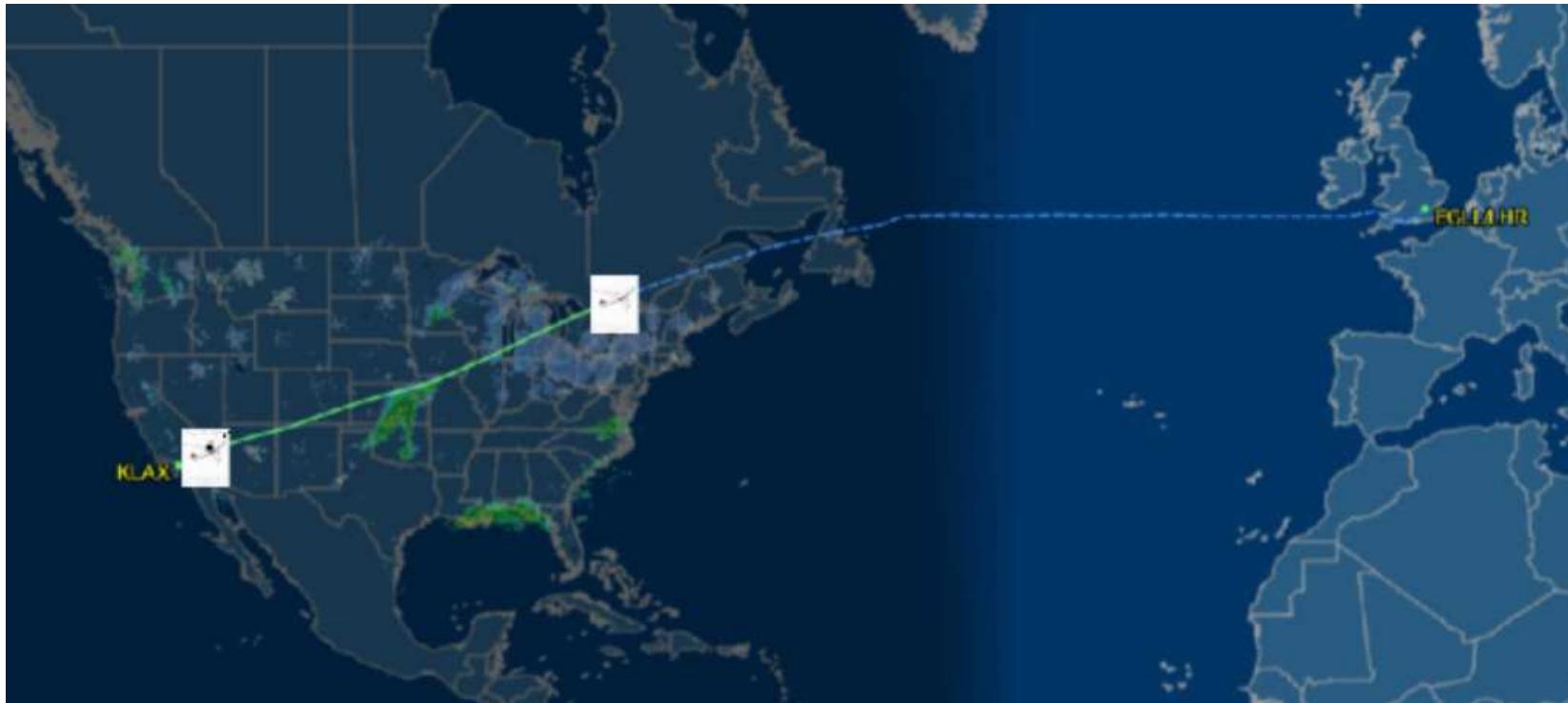
# Flight 268 – Case Study



In 2005, on a night flight from Los Angeles to London, immediately after take off, a banging sound was heard and passengers and ATC reported seeing flames from the No 2 engine of the B747. The symptoms and resultant turbine over-temperature were consistent with an engine surge; the crew completed the appropriate checklist, which led to the engine being shut down.

**Should this flight continue or return back?**

# Flight 268 – Case Study

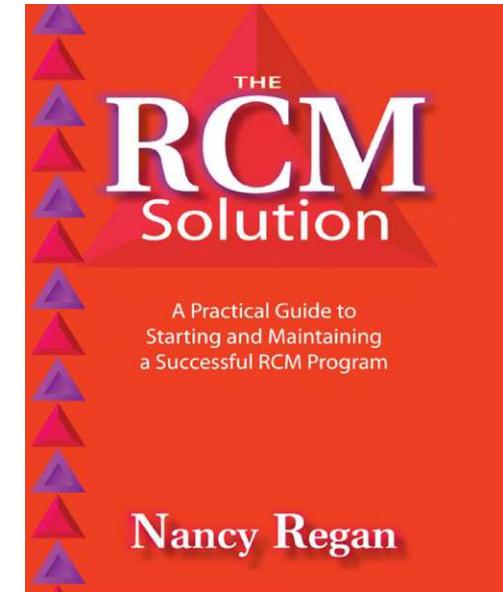


After assessing the situation, and in accordance with approved policy, the commander decided to continue the flight as planned rather than jettison fuel and return to Los Angeles. Having reached the east coast of the USA with no indications of further abnormality and with adequate predicted arrival fuel,

**Should this flight continue or divert?**

# Flight 268 – Case Study

The pilots successfully shut down the affected engine and notified the headquarters. **The management directed Flight 268 to carry on** with the flight to London. Senior Manager of B747 fleet said:



**"The decision to continue flying was a customer service issue. The plane is as safe on 3 engines as is on four and it can fly on two."** The company quickly assessed the consequences of the failure. If they had delayed or cancelled the flight, it would have **cost the company up to several hundred thousand dollars in passenger compensation** because of a recently passed European regulation regarding long flight delays or cancellations.

Source: Regan, Nancy, 2012, The RCM Solution: Reliability-Centred Maintenance, (Page 117, 118), Industrial Press Inc.  
[https://books.google.co.uk/books?id=UQiDBgAAQBAJ&pg=PA117&lpg=PA117&dq=british+airways+flight+268+engine+failure+2005&source=bl&ots=gidx-s6PdT&sig=HfwN-ao7LunprXzf7La933\\_z0jA&hl=en&sa=X&ved=0ahUKEwj4\\_arx-XLAhVEWRoKHXFPBIUQ6AEINDAE#v=onepage&q=british%20airways%20flight%20268%20engine%20failure%202005&f=false](https://books.google.co.uk/books?id=UQiDBgAAQBAJ&pg=PA117&lpg=PA117&dq=british+airways+flight+268+engine+failure+2005&source=bl&ots=gidx-s6PdT&sig=HfwN-ao7LunprXzf7La933_z0jA&hl=en&sa=X&ved=0ahUKEwj4_arx-XLAhVEWRoKHXFPBIUQ6AEINDAE#v=onepage&q=british%20airways%20flight%20268%20engine%20failure%202005&f=false)

an argument for introducing

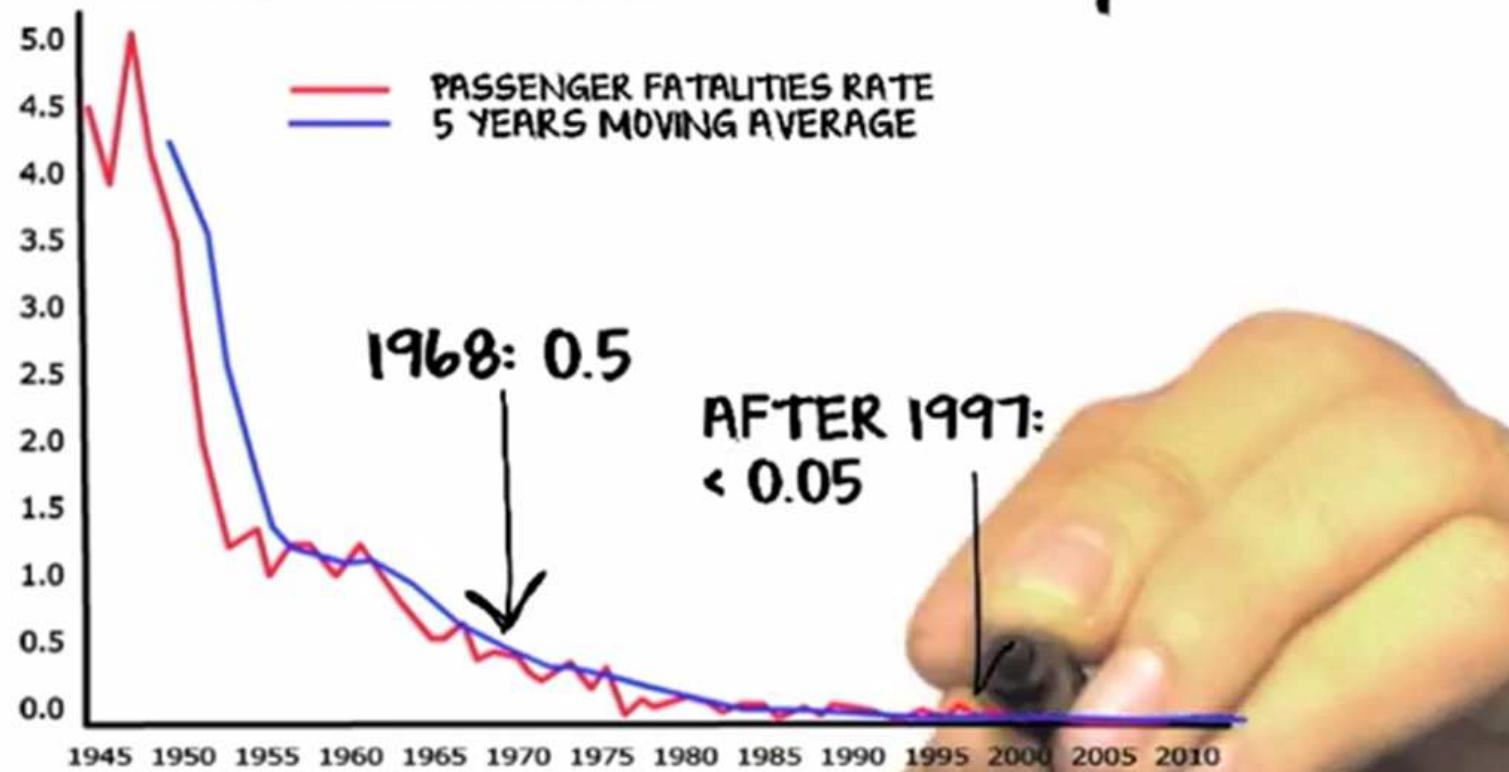
# Risk Culture

as a new component of 'Safety Culture'

# A FEW WORDS ABOUT THE STATE OF THE AIRLINE INDUSTRY IN 2016 AND FUTURE TARGETS

# ULTRA-SAFE SYSTEM & CHALLENGES

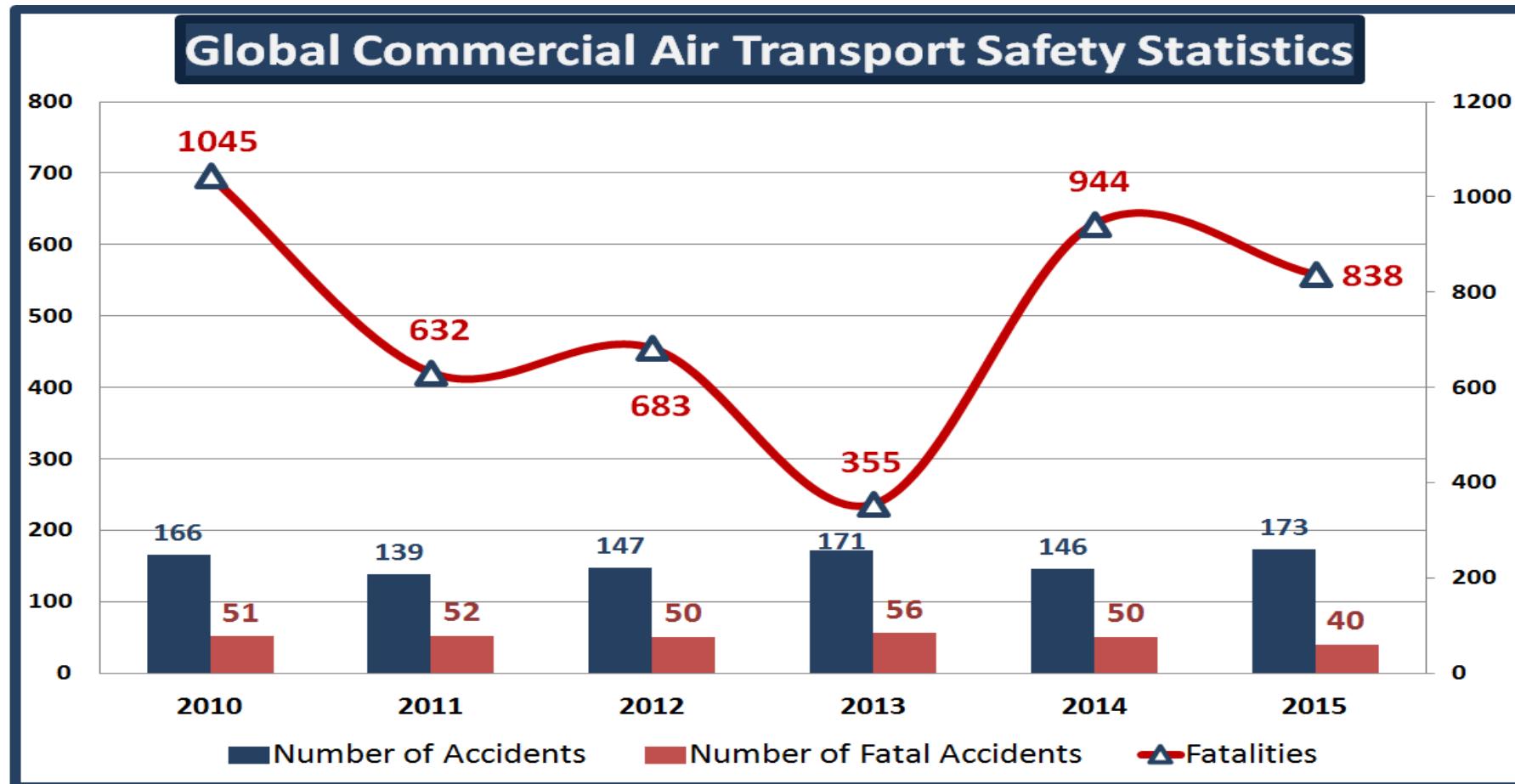
Global Fatalities 100 million pax miles



ECAST - European Commercial Aviation Safety Team

<https://youtu.be/IgDyhvXW8jM>

# ULTRA-SAFE SYSTEM & CHALLENGES



Source: Data compiled from Aviation Safety Network Database (<http://aviation-safety.net/database/>) & analysed by Cengiz Turkoglu. Military aviation accidents and also events caused by hostile action (i.e. a number of aircraft destroyed on the ground at Tripoli in 2014) were excluded.

# ULTRA-SAFE SYSTEM & CHALLENGES

## PROSPERO Context – Ultra-safe Systems

$10^{-6}$  or better:

The **next accident has never been seen before**. Its decomposition may invoke a series of already seen micro incidents, although most have been deemed inconsequential for safety.

Source: Nick McDonald, Centre for Innovative Human Systems, Trinity College Dublin,  
PROSPERO Presentation @ Aerodays 2015

# STATE OF THE AIRLINE INDUSTRY

## What drives the most cost conscious airline to operate business jets in order to deal with AOG across its network?

Monday 14 September 2015

Business Newsletter



Business Irish



All the news from

Irish Independent  
Digital Edition

The Digital Edition. Click here for

### Ryanair's fancy jet 'for engineers'

Grainne Cunningham

PUBLISHED

24/10/2012 | 05:00



SHARE

NO ONE could seriously accuse Ryanair of indulging in life's little luxuries -- so if the low-cost airline has acquired a fancy jet, it must be a money-saving device.

<http://www.independent.ie/business/irish/ryanairs-fancy-jet-for-engineers-28822767.html>

PUBLIC'S  
EXPECTATION?

BRUTAL  
COMPETITION?

Ryanair acquires new Learjet 45 M-ABGV

<http://irishaviationresearchinstitute.blogspot.co.uk/2014/06/ryanair-acquires-new-learjet-45-m-abgv.html>



Irish ultra low cost carrier Ryanair has recently acquired a second Learjet 45 to support its growing operation across Europe, ahead of taking delivery of 180 new Boeing 737-800s from September 2014 onwards.

Aircraft will achieve a **five-fold reduction in the average accident rate of global operators.**

Aircraft will **drastically reduce the impact of human error.**



**The occurrence and impact of human error is significantly reduced through new designs and training processes and through technologies that support decision-making.**

**if we want to achieve such goals,  
we need to **THINK DIFFERENTLY****

# **we need to continue ...**

**making intelligent rules**

**and complying with them**

**collecting operational data**

**and investigating to learn lessons**

**but predicting future, based on  
occurrence data and past  
performance has its limitations**



# WHY RISK CULTURE?

This is an argument based on some of the ‘Safety Culture’ concepts and models well-known and applied in aviation.

It aims to add another component to the existing framework based on the ‘Risk Culture’ guidance material produced by **Institute of Risk Management (IRM)**, which was developed to supplement ISO 31000 *Risk management – Principles and guidelines*.

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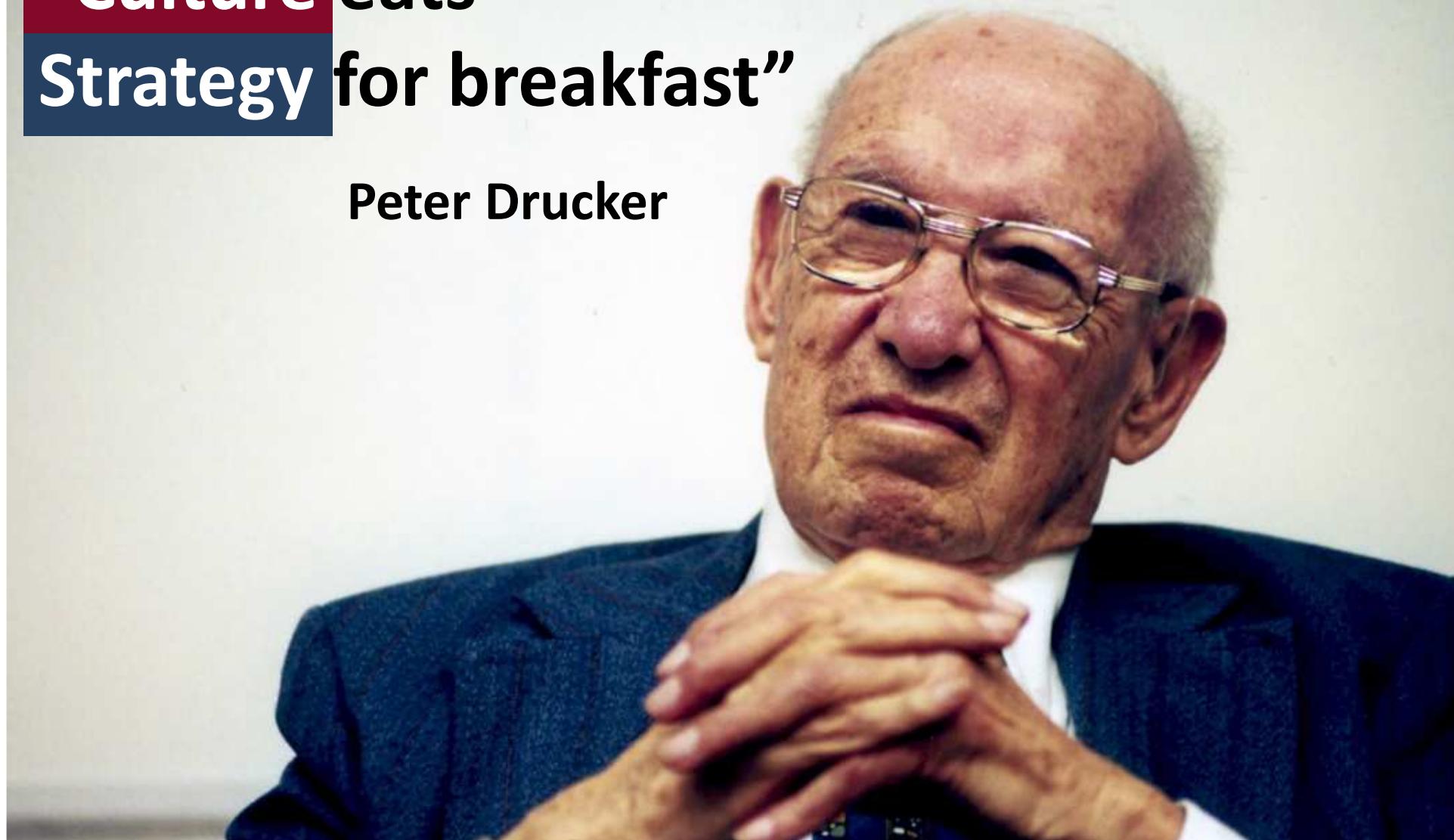
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CULTURE

#1 CULTURE MATTERS

**“Culture eats  
Strategy for breakfast”**

**Peter Drucker**



Drucker's well known quote sums it up. **Achieving results heavily depends on the organisational culture however good the strategy is.**

# Corporate Culture - Key to Success



# #2

# RISK

# Case Study – Flying A/C with AD Non-compliances

The Operator notified the NAA (As part of Voluntary Reporting Program) that up to 100 aircraft were overdue for a structural AD inspection

The Operator submitted its formal report that a total of 47 A/C were non-compliant

The non-complying aircraft were brought into compliance; however both NAA and The Operator chose to ground the 47 aircraft, which were operated in revenue service.

The NAA closed the voluntary report

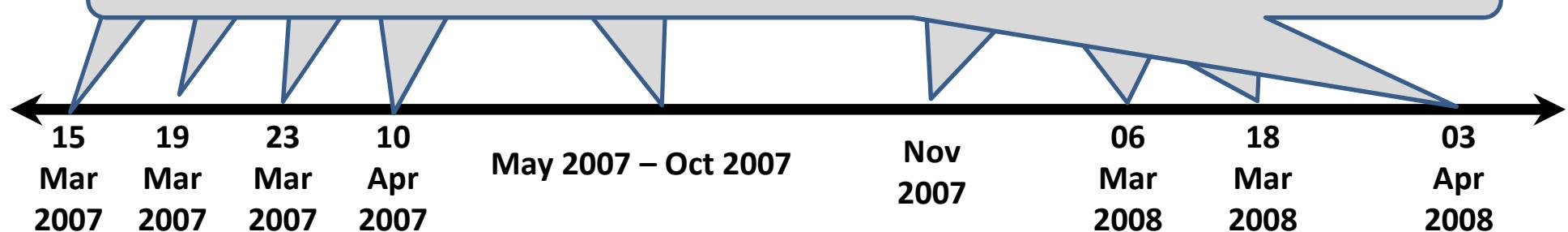
According to NAA, several internal investigations were conducted during 5-6 months

The NAA Headquarters reopened the case

NAA initiated action to seek a multi-million civil penalty against the Operator

The NAA directed its inspectors to reconfirm that all AOC holders have complied with all Airworthiness Directives

A public hearing took place about the NAA's oversight of the industry



# ENTREPRENEURSHIP & RISK ATTITUDE



FUNDAMENTAL CONCEPTS &  
PREMISES FOR THE ARGUMENT

INTRODUCING  
**‘RISK CULTURE’**  
AS A NEW COMPONENT OF  
**‘SAFETY CULTURE’**

# RISK = SEVERITY X LIKELIHOOD

Safety **risk** is the projected likelihood and severity of the consequences or outcomes from an existing **hazard** or situation.

(ICAO SMM)



HAZARDS  
(PRESENT)

RISKS  
(FUTURE)

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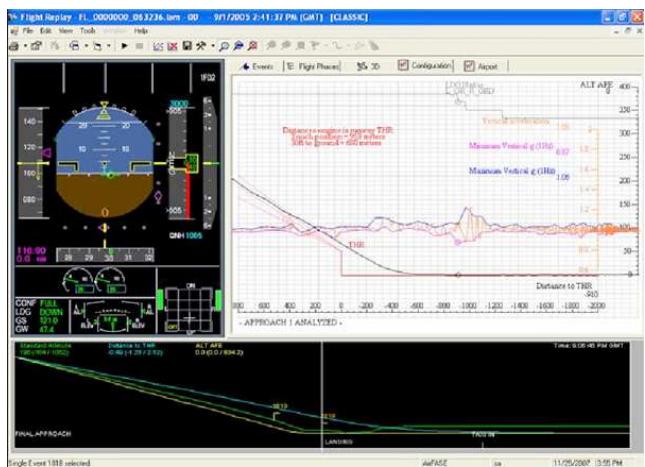
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# RISK MANAGEMENT

# 1

# HAZARD IDENTIFICATION



# REACTIVE

# PROACTIVE



# PREDICTIVE



# RISK MANAGEMENT

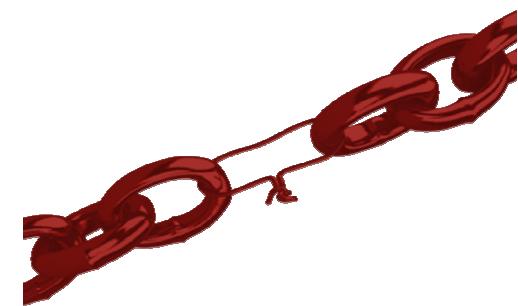
2

## RISK ASSESSMENT



ANALYSING

QUANTIFYING



PRIORITISING

# RISK MANAGEMENT

3

## RISK CONTROL

MITIGATING



ELIMINATING



BALANCING

**‘acceptable level of safety’**

**‘risk attitude’**

**‘risk appetite’**

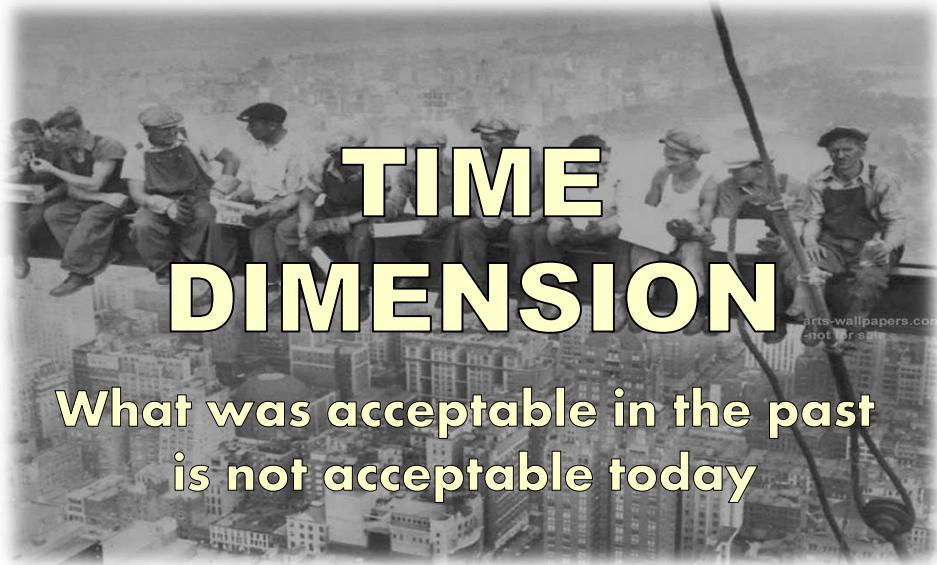
**‘perception of risk’**

**‘risk tolerability’**

**inevitably subjective**

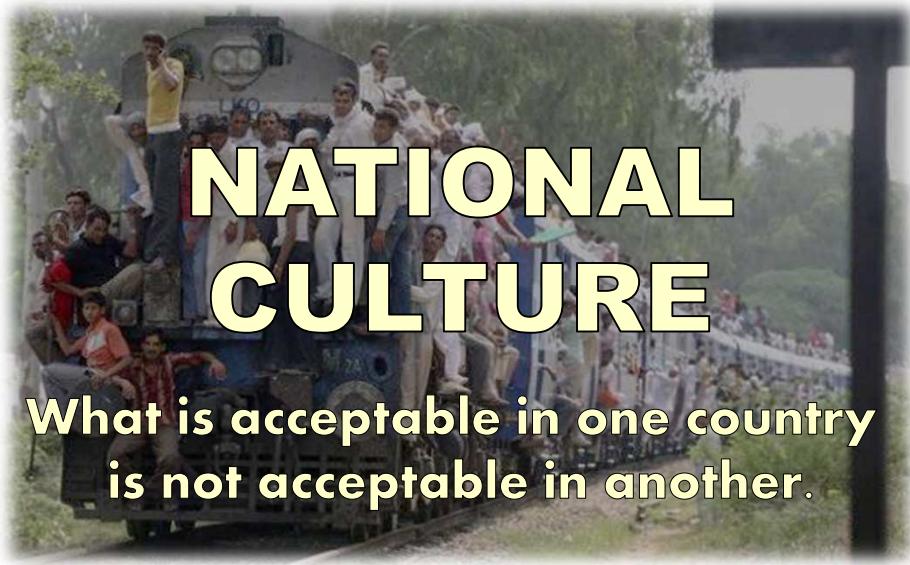
**based on many different factors**

**here are some examples ...**



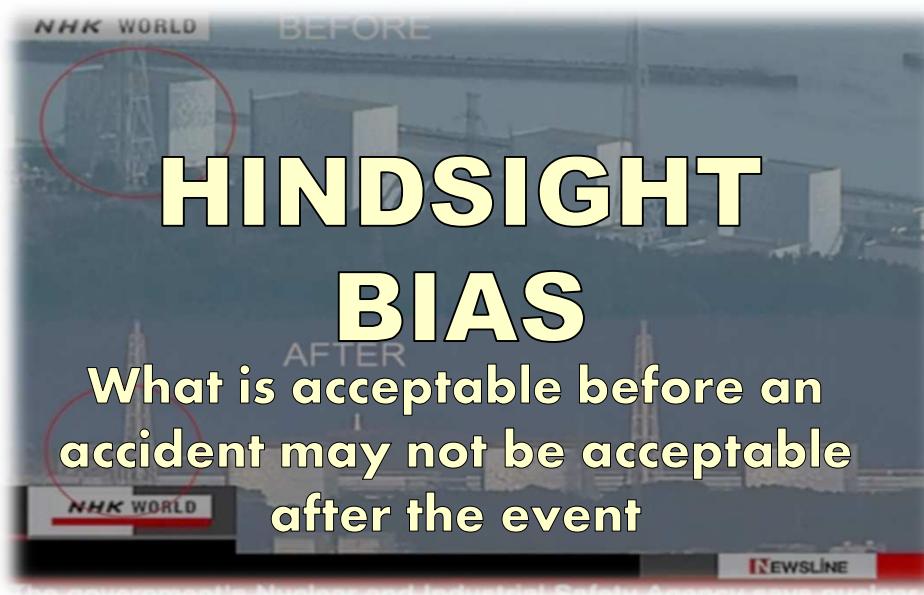
## TIME DIMENSION

What was acceptable in the past  
is not acceptable today



## NATIONAL CULTURE

What is acceptable in one country  
is not acceptable in another.



## HINDSIGHT BIAS

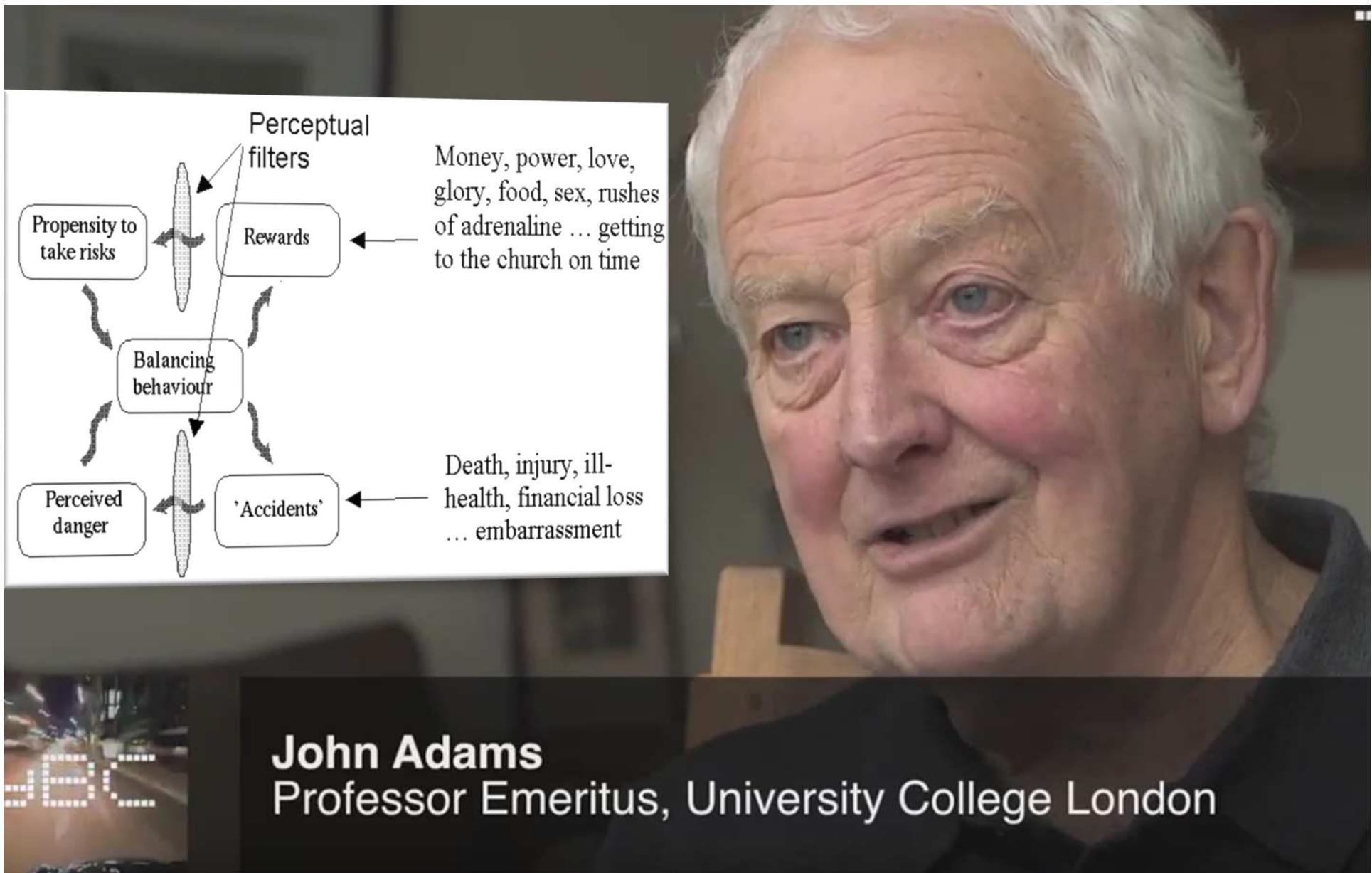
What is acceptable before an  
accident may not be acceptable  
after the event



## PERSONAL CHOICES

What is acceptable to one person  
may not be acceptable to another

# “Risk management: it’s not rocket science. It’s more complicated than that.”



The diagram illustrates a complex process of risk management. It features a central box labeled 'Balancing behaviour' with two arrows pointing away to two separate columns of boxes. The left column, associated with 'Perceptual filters', contains 'Propensity to take risks' (with an arrow to 'Rewards') and 'Perceived danger' (with an arrow to "'Accidents'"). The right column contains 'Money, power, love, glory, food, sex, rushes of adrenaline ... getting to the church on time' (with an arrow to 'Rewards') and 'Death, injury, ill-health, financial loss ... embarrassment' (with an arrow to "'Accidents'").

**John Adams**  
Professor Emeritus, University College London

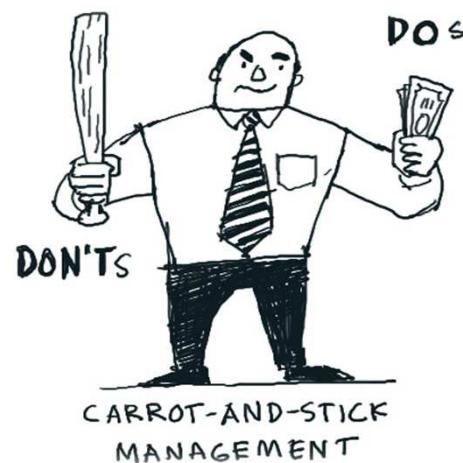
**Front line operators facing**



**conflicting goals influenced by external factors and**

**incentives and penalties to achieve them**

**are typical characteristics of the airline industry**



# CULTURE

'the unwritten rules  
of the **social** game'

Geert Hofstede



Commercial Air Transport: 'A Complex **Socio-technical** System'

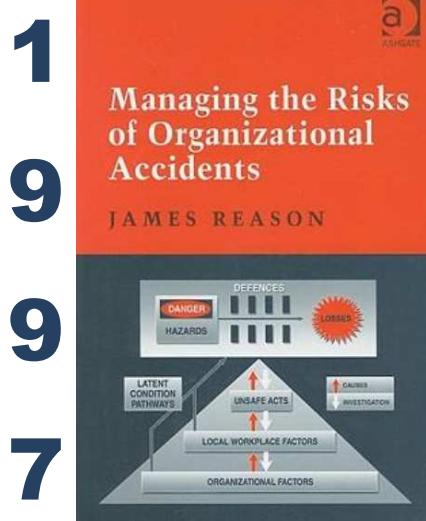
**“engineering a safety culture”**  
(an informed culture)



Prof. J Reason

**just culture**  
**reporting culture**

**learning culture**  
**flexible culture**



**2016 - risk culture?**

# *Just Culture*



# three categories of human behaviour (by David Marx)



Human Error  
Inadvertent  
At-Risk  
Choice to Drift  
Reckless  
Conscious  
Disregard

Human Error  
= Console  
At-Risk  
= Coach  
Reckless  
= Punish

Reckless (Negligent)

At Risk (Risk Taking)

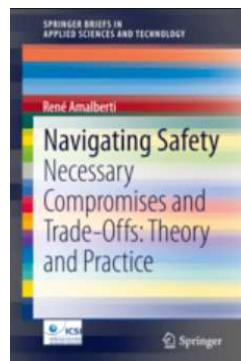
Error (Mistake)

# paradoxes

# **criminalisation of accidents, and the litigation culture in society, ...**



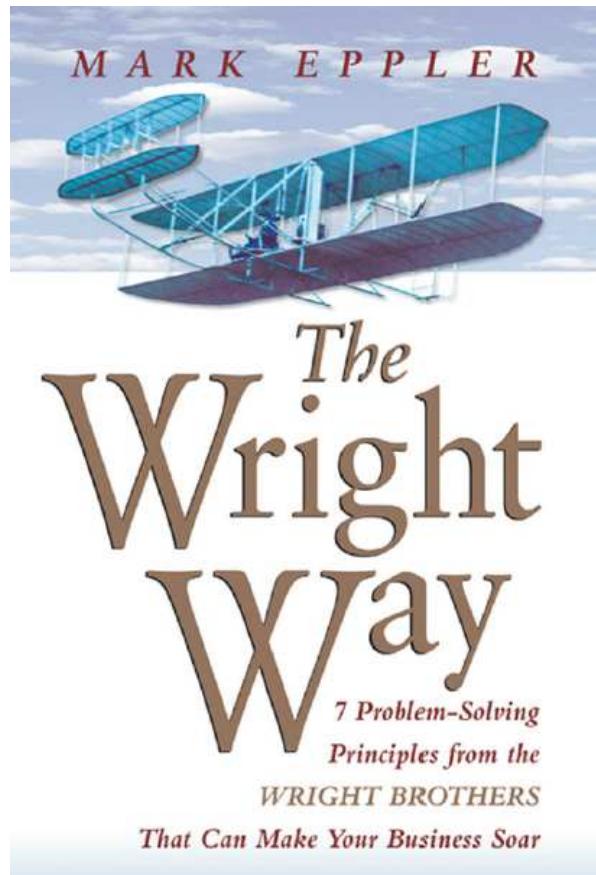
# does 'compensation culture' lead to ... 'risk blindness' in society?



*"Safety is a paradox; people demand safety once they have taken risks."*

René Amalberti

# MAIN ARGUMENT



over a century later,

In 1900, Wilbur wrote to his father,

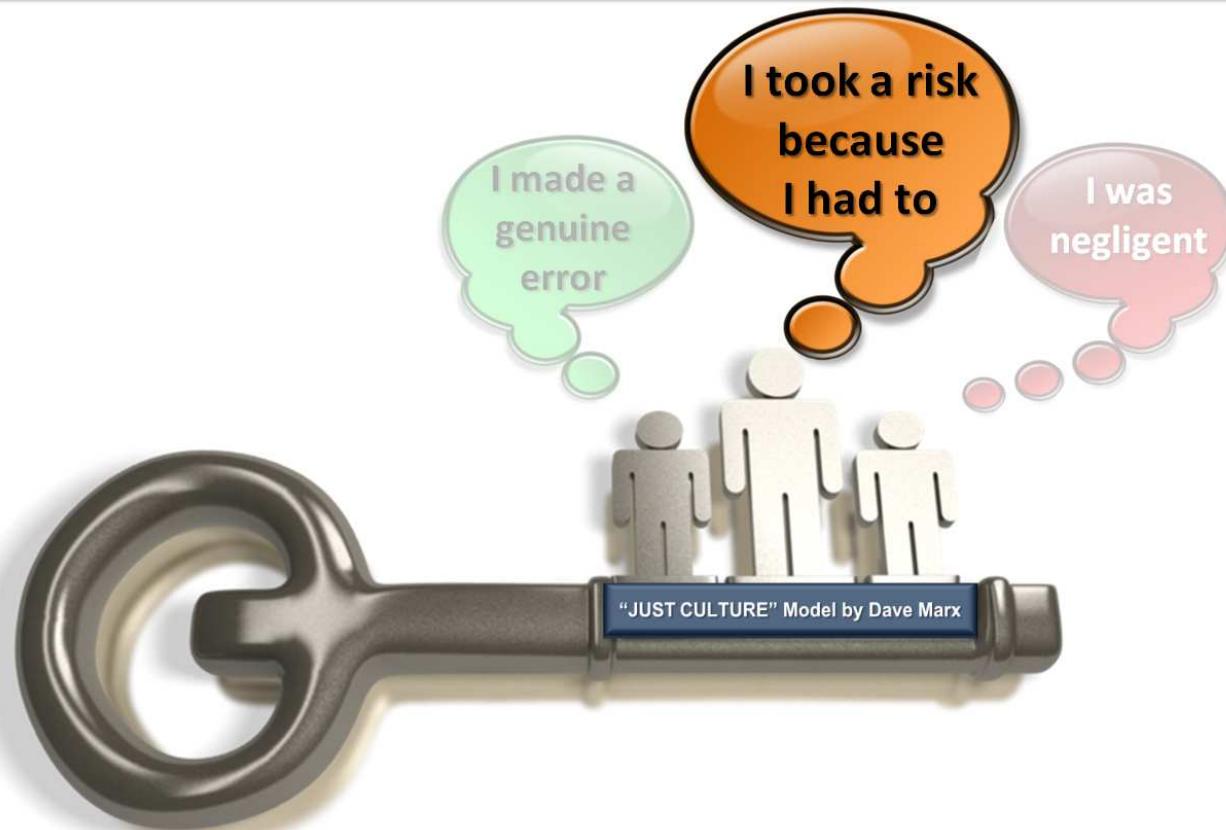
**“Carelessness & overconfidence,”** he said,

**“are usually more dangerous than**

**deliberately accepted risks.”**

**I argue differently**

## HUMAN ELEMENT IS THE KEY TO ENSURING FLIGHT SAFETY



addressing **human reliability** and particularly **individuals' attitude towards risk** is much more **challenging** than preventing errors therefore I believe **factors driving/encouraging professionals to accept certain risks** pose more **significant threat** to flight safety.

**if managing safety means,**

**managing  
risk**

**then...**

# SHOULDN'T WE ALSO CONSIDER RISK CULTURE?

HOW RISK IS PERCEIVED ACROSS THE ORGANISATION AND  
HOW RISK DECISIONS ARE MADE AT DIFFERENT LEVELS?



The Institute of Risk Management  
**Risk culture**  
Under the Microscope  
Guidance for Boards

The concept of  
**‘Risk Culture’**  
evaluation in an organisation

# let's not try to

# measure culture



***“Not everything that counts can be counted,  
and not everything that can be counted counts”***

W. B. Cameron (widely attributed to Albert Einstein)

Source: This quote was used by Dr. John Carroll, MIT Sloan School of Management at the NTSB's 2 day event on Safety Culture 10-11 September 2013

A quote that is incorrectly attributed to W. Edwards Deming. **“You can't manage what you can't measure.”**

In fact, he repeatedly said the opposite **“It is wrong to suppose that if you can't measure it,  
you can't manage it – a costly myth.”**

Source: <http://blog.deming.org/w-edwards-deming-quotes/large-list-of-quotes-by-w-edwards-deming/>

## THE SEVEN DEADLY DISEASES OF MANAGEMENT (Item 5)

**“Management by use only of visible figures, with little or no consideration of figures that are unknown or unknowable.”**

Source: Deming, W. Edwards (2011-11-09). Out of the Crisis (pp. 97-98). MIT Press.

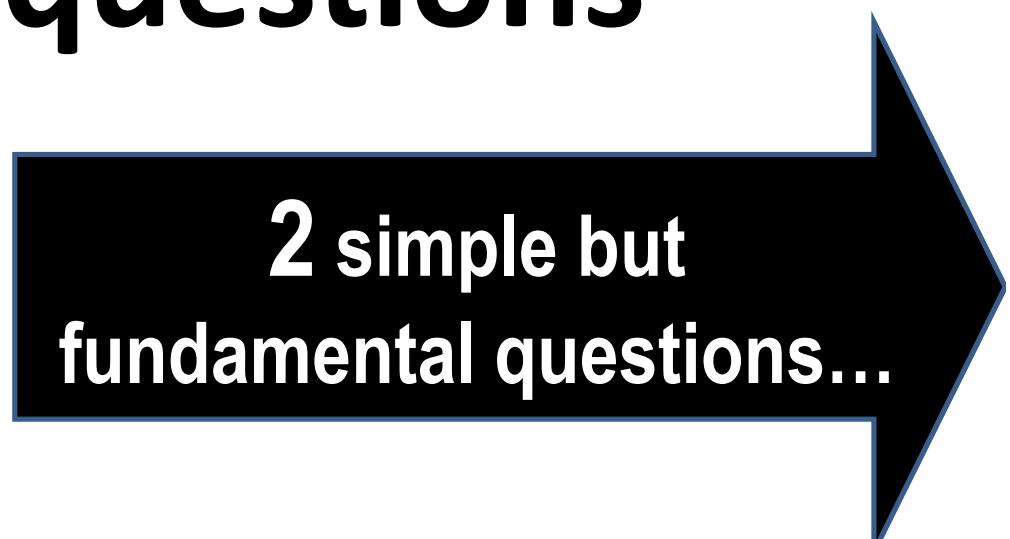
## **SIMPLICITY IS THE ANSWER, WHAT'S THE QUESTION?**

“Any intelligent fool can make things bigger and more complex...

It takes a touch of genius and a lot of courage to move in the opposite direction.”

E.F. Schumacher

**let's not ask  
10's of questions**



**2 simple but  
fundamental questions...**



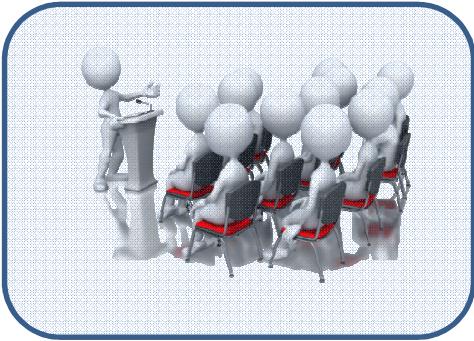
**1**

**A scenario & decision  
'accepted/acceptable risk'**



**2**

**A scenario & decision  
'unacceptable/rejected risk'**



## **stage 1**

**collect data from front line staff**

(dedicated workshops or during recurrent training or questionnaires)



## **stage 2**

**ask the same risk decisions to senior management**



## **stage 3**

**analysis of data, which may:**

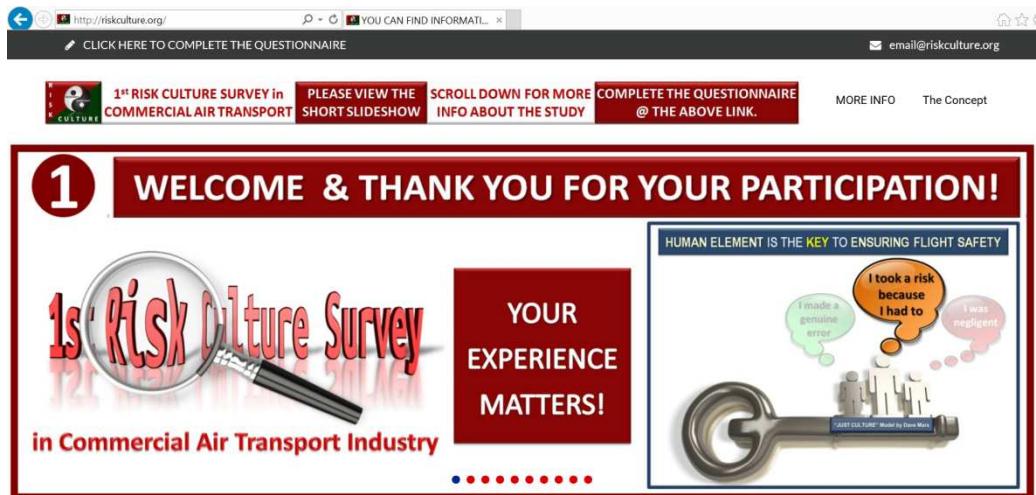
**reveal gaps in risk perception/attitude/appetite**

**require management action to clarify acceptable &unacceptable risks**

## So far .....

- **2 workshops conducted**
  - As part of Operators' internal safety event
  - 1 in Far East and 1 EU Operator
- **Limited data collected**
- **Good news – Limited opportunity to take risks**
- **Common themes on risk taking behaviour**
  - Acceptance of Defects
  - Commercial Pressure
  - Fatigue

# PHASE 1: INDUSTRY-WIDE SURVEY



The screenshot shows the homepage of the '1st Risk Culture Survey in Commercial Air Transport'. The top navigation bar includes links for 'CLICK HERE TO COMPLETE THE QUESTIONNAIRE', 'email@riskculture.org', 'MORE INFO', and 'The Concept'. Below the navigation, there are buttons for '1st RISK CULTURE SURVEY in COMMERCIAL AIR TRANSPORT', 'PLEASE VIEW THE SHORT SLIDESHOW', 'SCROLL DOWN FOR MORE INFO ABOUT THE STUDY', and 'COMPLETE THE QUESTIONNAIRE @ THE ABOVE LINK.' A large red '1' is followed by the text 'WELCOME & THANK YOU FOR YOUR PARTICIPATION!'. To the left is a magnifying glass icon over the text '1st Risk Culture Survey in Commercial Air Transport Industry'. To the right is a red box containing the text 'YOUR EXPERIENCE MATTERS!' and a small illustration of a key labeled 'JUST CULTURE Model by Dave Marx'. A sidebar on the right features the text 'HUMAN ELEMENT IS THE KEY TO ENSURING FLIGHT SAFETY' with three speech bubbles: 'I made a genuine error', 'I took a risk because I had to', and 'I was negligent'.

**www.riskculture.org**  
**email@riskculture.org**

**Questionnaire**  
**(April to July 2016)**



The screenshot shows a different section of the website. It features a large magnifying glass over the word 'RISK CULTURE'. The magnifying glass is positioned over the word 'CULTURE'. The background contains text about the 'Risk Culture Survey in Commercial Air Transport Industry' and 'Safety Management System', 'Risk Management', 'Safety Culture', 'Reporting Culture', 'Learning Culture', 'Flexible Culture', 'Human Factors', 'Organisational Culture', 'National Culture', 'Professional Culture', and 'What are the factors encouraging pilots and engineers to take risks? Are the risks taken by pilots and engineers acceptable to senior management?'. Below this is a section titled 'WHY TO PARTICIPATE?' and 'YOUR EXPERIENCE SHOULD & CAN MAKE A DIFFERENCE'. It also mentions 'ALSO ENTER A '£1500 BURSARY' DRAW TO ATTEND A COURSE @ Cranfield UNIVERSITY'.

**'RISK CULTURE' amongst Pilots and Engineers  
in Commercial Air Transport Industry**

## PHASE 2: MULTIPLE CASE STUDIES

### THE ANALYSIS OF DATA FROM PHASE 1

The Phase 1 data will enable to design case studies to suit the profile of the participating organisations.

### PARTICIPATING ORGANISATIONS

**2 Large International Airlines based in the Far East**

**1 Large Airline/MRO organisation in the UK**

**1 Large Airline/MRO organisation in Europe**

**Potentially up to another 10 different airlines & MRO organisations in EU, Middle East/Turkey**

**PLEASE CONTACT IF YOU WISH TO PARTICIPATE**

# POTENTIAL OUTCOMES OF THE STUDY

## PROACTIVE HAZARD IDENTIFICATION

This rather simple but potentially beneficial concept/methodology may **identify some hazards which may not be reported through the usual reporting processes** such as 'occurrence and/or hazard reporting'

It **may also identify 'excessive risk taking' attitude/practices amongst the frontline operators**

Finally it **may also identify some systemic issues driving people to take risks.**

# POTENTIAL OUTCOMES OF THE STUDY

## ENABLE MANAGEMENT TO EMPATHISE WITH FRONTLINE OPERATORS

By identifying such issues, perhaps the top management can understand the challenges front line operators face.

## PROACTIVE IMPLEMENTATION OF 'JUST CULTURE'

Ultimately this approach may prevent situations that front line operators or even their managers take some level of risk, which resulted with a bad outcome and subsequently a disciplinary action was taken as part of just culture policy. Because in many cases, the **adverse effect of a disciplinary action on 'reporting culture'** is inevitable and it may take a **long time to regain the trust** of front line operators.

## POTENTIAL ACTIONS TO BE TAKEN

Some accepted risks by front line operators or their line managers may not be acceptable to senior/top management. In this case, communication to clarify 'what's acceptable' and 'what's not' may be a simple solution so that the front line operators have the assurance.

## PROACTIVE IMPLEMENTATION OF JUST CULTURE

Investigating some systemic causal factors may require policy changes or even investment decisions to be made.

# THANK YOU FOR YOUR ATTENTION!

