

RAF Institute of Aviation Medicine

Captains describing co-pilots...

Competitive

Over-confident

Obstructive

Obnoxious

Bolshie

Difficult

Un-Cooperative

Lazy

No sense of humour

Complainer

Resentful

Minimiser

Co-pilots describing captains...

Over-confident

Arrogant

Abrasive

Bad tempered

Unpleasant

Sarcastic

Over-critical

Pig-headed

Aggressive

Tyrannical

Authoritarian

Incompetent



An Exploratory Study of the Interaction between Airline Pilots and Maintenance Engineers; Identification of Barriers to Effective Interpersonal Communication and the Associated Impact on Airline Operations

Cleared to Disconnect?

Tahlia Fisher, PhD Candidate Massey
University School of Aviation

Justification for the Study
Anecdotal Information
What the Literature Shows
Research Outline



Justification for Study

Justification for study



Anecdotal evidence....

Contributing factor to at least one accident



What lies beneath?

Justification for study



Anecdotal evidence....

ASRS Reports

Flight Attendant called at 2000ft during climb - right aft lavatory was flushing continuously. Contacted Maintenance Control and accessed System Handbook. The NextGen System Manual mentions an electric vacuum pump. My concern was that the pump might continue to run. Maintenance Control said that there was no pump that this system was different than the B737-400 as it was a vacuum system that involved a compressor. **This created confusion** because what they were telling us **was in conflict** with our Systems Handbook information. Maintenance Control said that as long as the flushing had stopped and we were having no pressurization problems we were OK to continue. When we asked them to take a look at that page, **they obviously did not look at the page** because they kept talking about a compressor driven vacuum. A quick review of that page after we mentioned it to them would have gone a long way toward clarifying our concern. When I asked if Maintenance Control could assure us that the electric pump was not continuing to run, the comment was made that, "I can't assure you of that, I'm in an office and you are at 30,000ft" was **uncalled for and very unprofessional**.

Why should a flight crew ever be in a position of having to argue with Maintenance Control about a system clearly described in our Manuals? Our entire operation should be based upon supporting the ones who are at "30,000ft", not being **agitated by their problems**. We look to Maintenance for guidance. In this case they provided very little information, but what they did provide was in conflict with our System Handbook. **The manner and tone of their communication with us did little but exasperate our problem**

Justification for study



Anecdotal evidence....

Logbook frustrations

```
DOOR OPEN LIGHT ON IN LATER STAGE OF FLI LCHC ORDF
Text DOOR OPEN LIGHT ON IN LATER STAGE OF FLIGHT
OJI75210 PASSENGER/CREW
```

Which door? When exactly? Other indications? Did it stay on?

```
THE UPPER REAR LEFT HAND PANEL SCREW IS LWLG ORDF
Text THE UPPER REAR LEFT HAND PANEL SCREW IS LOOSE.
DJH72500 EQUIPMENT/FURNISHINGS GENERAL
00000000 PILOT 01 01 0011 LWLG 000
```

Fantastic detail.....but where's the panel???

And a personal favourite....

```
00100000 0100000 00110000 KNOB LOOSE GRUB SCREW MISSING
Text CO PILOTS KNOB LOOSE - GRUB SCREW MISSING
00100000 WINDOWS, WINDSHIELDS AND DOORS
00034002 PILOT
0010 KNOB REFITTED LKXL Just as well...!!!
```

Justification for study



Anecdotal evidence....

Time spent with engineers and pilots at three organisations

The discussion then turned to differences between pilots and engineers

One engineer thought that they (engineers) were the type of people who liked working with their hands and putting things together while pilots are:

“probably more into image, like walking through an airport terminal with people looking at them...”

Another engineer had worked in an airline and said things are much worse there than at GA level:

“It’s the difference between stripes on the shoulder and overalls – airline pilots are pigs, they treat you just like a mechanic...”

One of the other engineers played an instrument in an orchestra in his spare time and he likened engineers to the musicians and pilots to the singer:

“singers are more ego-centric like pilots, you know the ‘prima-donna’”

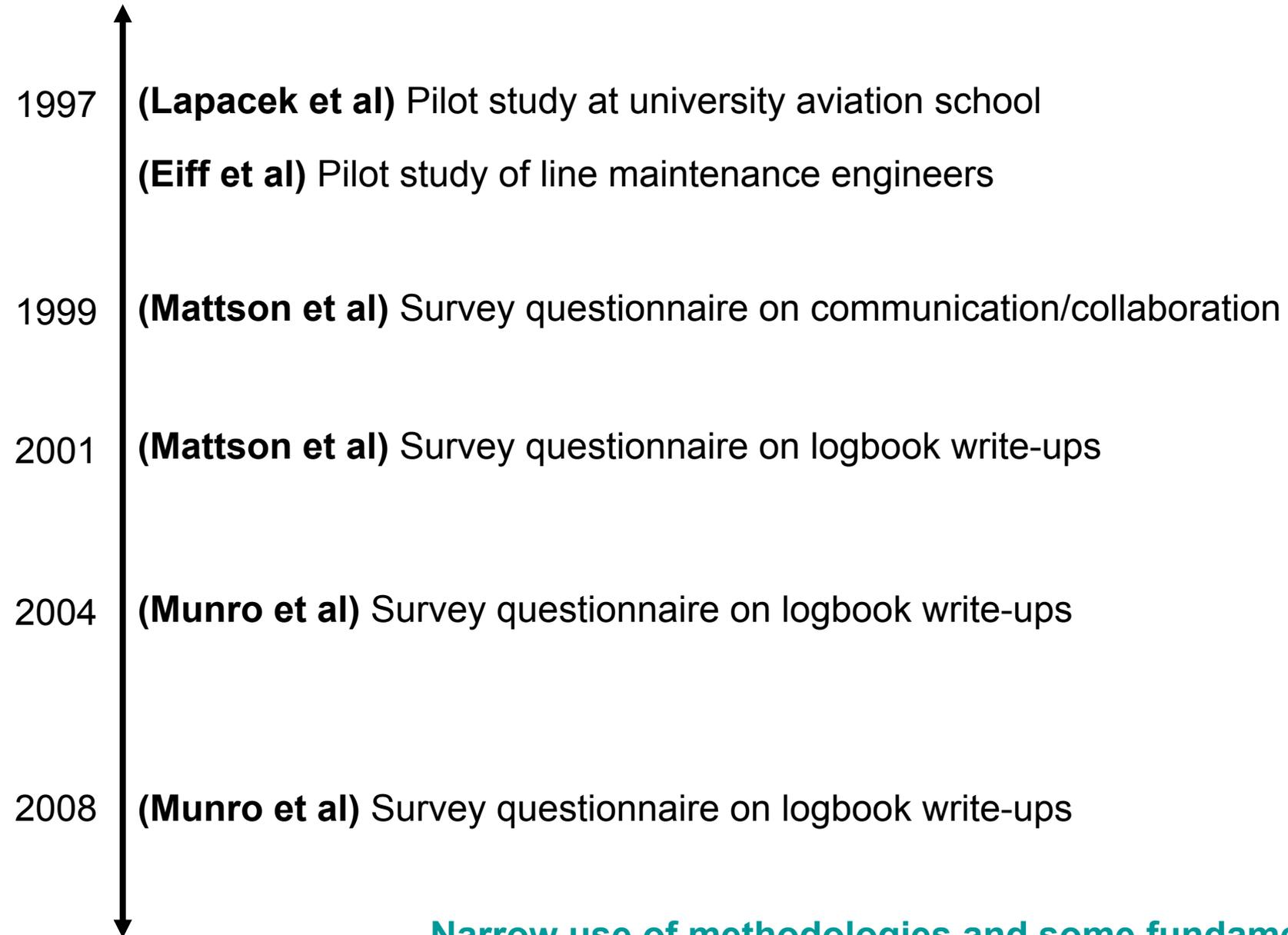


Justification for study

Academic research....



**What the
Literature Shows**



Narrow use of methodologies and some fundamental questions remain unanswered

1997 (Lapacek et al) Pilot study at university aviation school

Utilised staff/students at Purdue University's flight training center/maintenance facility

Key Findings: engineers rated the quality of pilots' logbook write-ups (on average) a 3.5 on a Likert-scale of 1-5.

21% defects which were written up could not be duplicated by engineering

25% of the logbook entries need clarification because the handwriting was poor

“How frequently have write-ups been discussed and/or taught in your schooling?”
response average was 2.2 (on a Likert-scale of 1-5)

Recreation of a 'line' environment was made using a B727 simulator rigged with a defect. Maintenance personnel who were able to speak to the flight crew rectified the defect more quickly than those who were only shown the logbook write-up.

“An overriding theme in all the research was that attitudes and stereotypes of each others' profession many times foster breakdowns in communication”

1997 (Eiff et al) Pilot study of line maintenance engineers

Series of observations conducted within line maintenance environment at a large US airline

Key Findings: Engineers were troubled by perceptions (held by other aviation personnel and the general public) that their profession was greatly undervalued and unappreciated

Almost unanimous agreement that pilots were treated with a great deal more respect and consideration despite believing that their job was just as important to flight safety

Observers reported back that they were 'struck by the intensity' of inter-personal conflicts which apparently 'dominated' the workplace.

With regard to pilots and engineers relationship: *"The interface was often marked by tension. Conflict often arose through disagreement of 'whose aircraft' it was at a particular moment, the dispatchability of the aircraft or what was an appropriate fix for a problem.*

1999/2001 (Mattson et al) Survey questionnaires on collaboration

Survey distributed across general, military, regional carriers, corporate aviation in the US

Key Findings: both groups (pilots and engineers) viewed themselves as being slightly more mentally capable than the other.

Both groups reported being perceived by the other group as being significantly less capable than they viewed themselves.

Both groups perceived that they are viewed by the other as less technically competent than they viewed themselves

46.3% said the logbook write-up didn't work well; 31.6% said face-to-face communication didn't work well

82.9% surveyed thought that training which integrated both groups would be beneficial. Reasons given included: *'job awareness'* and *'breaking down the wall of mistrust/conflict/close-mindedness'*.

2004/2008 (Munro et al) Survey questionnaires on logbook communication

Survey distributed to 2 major US airlines

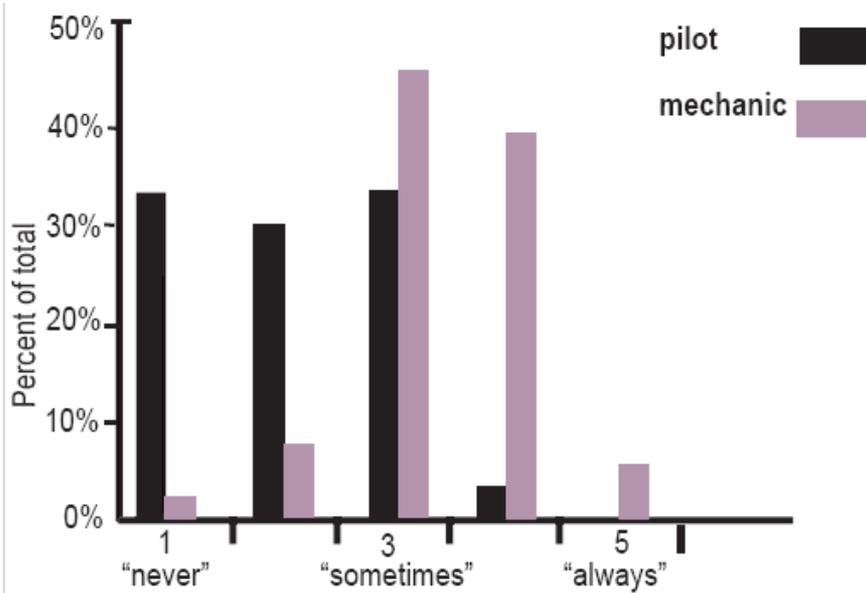


Figure 1: How often do pilots write-up items as "inop" with no additional detail?

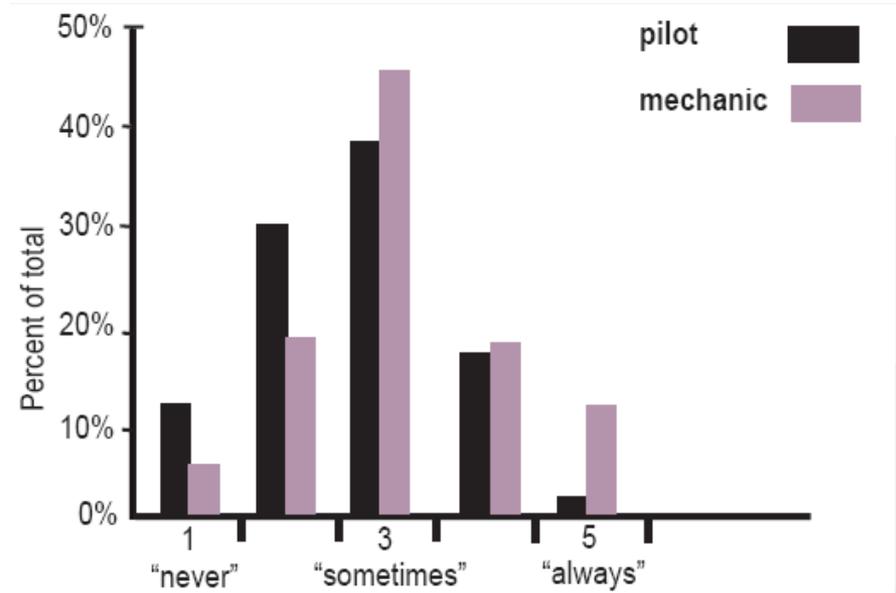


Figure 2: How often do engineers provide more than just the maintenance manual reference?

2004/2008 (Munro et al) Survey questionnaires on logbook communication

Survey distributed to 2 major US airlines

Key Findings:

Pilots reported spending less time filling out the logbook and neither group tended to write any more information than the form physically allowed

Pilots and engineers only met at the gate 'sometimes'

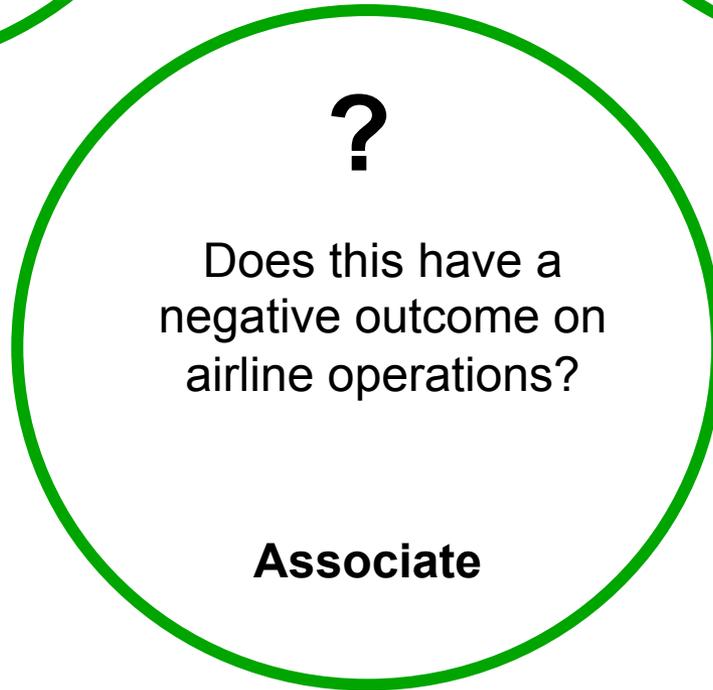
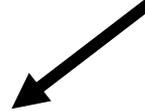
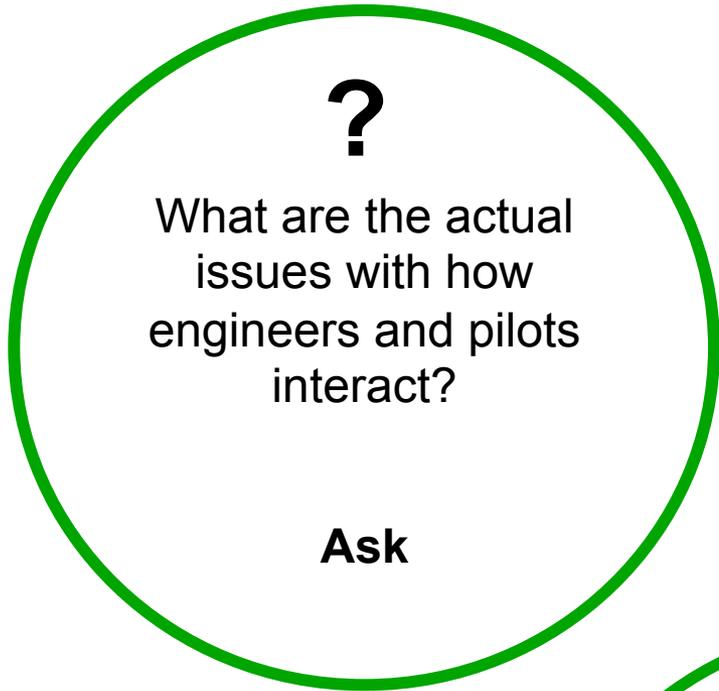
Engineers had an accepted norm within their group about how much detail to write – pilots did not

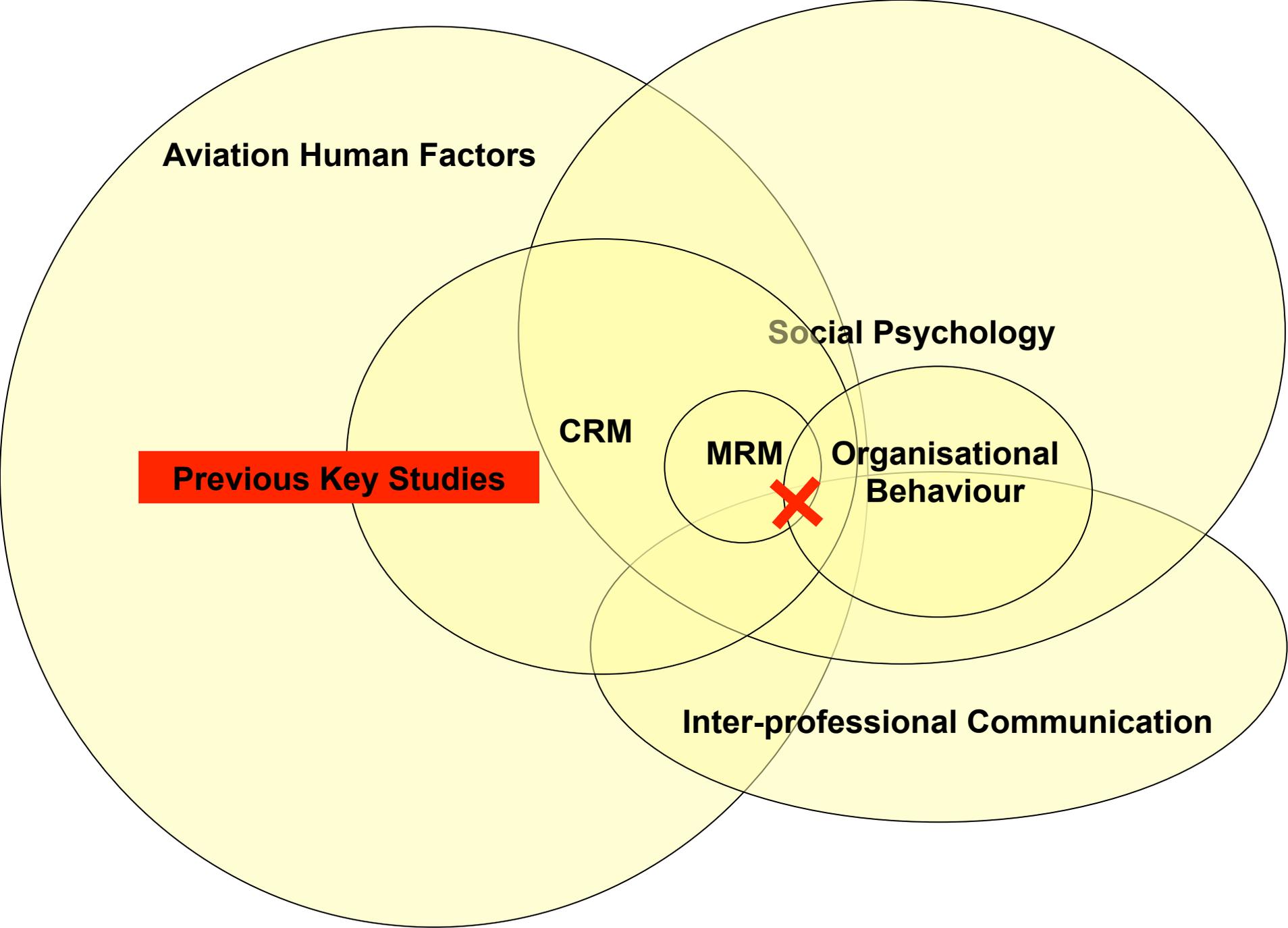
Pilots wrote for an audience of: maintenance, other flight crews, company, FAA, other.

Mechanics wrote for an audience of: FAA, flight crews, maintenance, company, other



Research Outline





Aviation Human Factors

Social Psychology

CRM

MRM

**Organisational
Behaviour**

Previous Key Studies

Inter-professional Communication

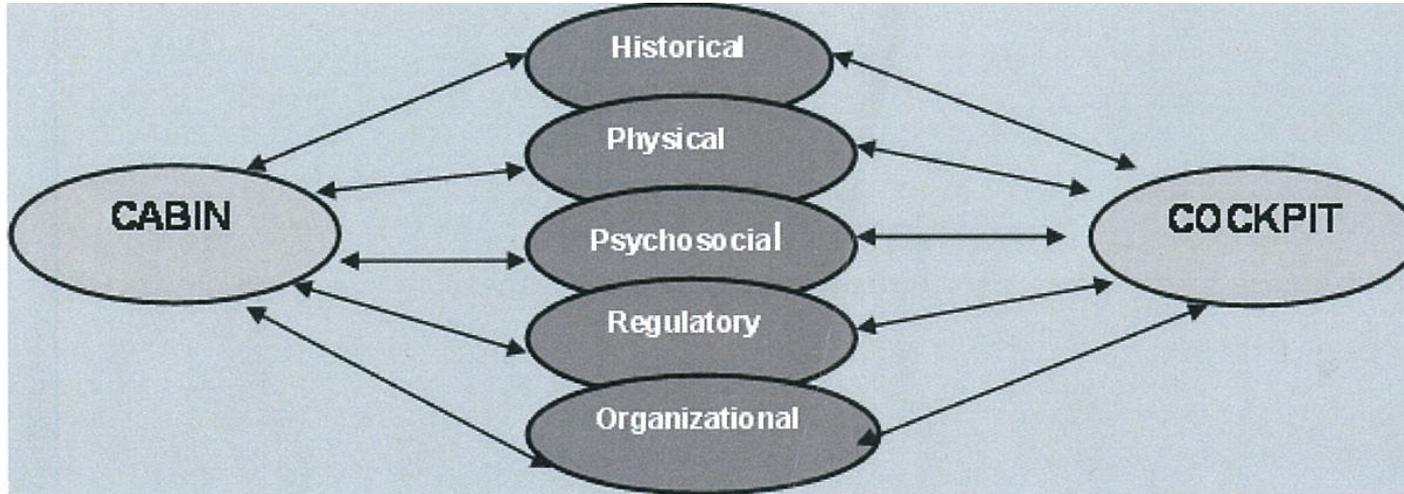
Task-related conflict vs. Interpersonal conflict (Jehn)

Task conflict exists when there is disagreement among personnel with regard to tasks being performed including differences in viewpoints, ideas and opinions

Relationship conflict exists when there are interpersonal incompatibilities among personnel, which typically includes tension, animosity and annoyance

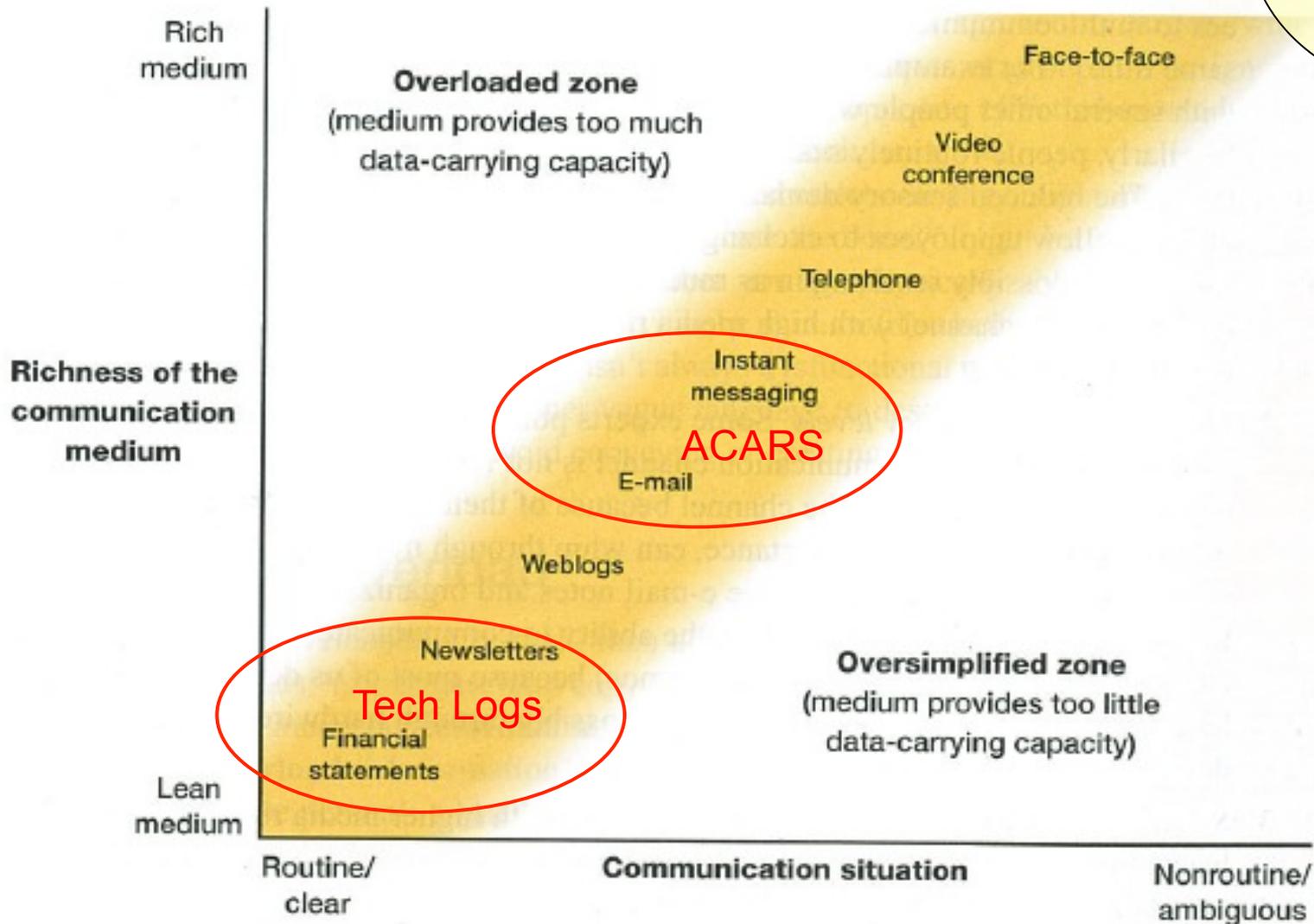


Information Transfer Model (Chute & Weiner)



Media Richness Hierarchy (McShane & Von Glinow)

Organisational Behaviour



HI.

STRONG VIBRATION FELT IN CLB FRM 10000FT
UP TO 16000FT. LIKE LANDING LGTS STILL OUT
BUT MUCH STRONGER. DIDN'T DISAPPEAR WHEN WE REDUCED
AIRSPEED. REAR CABIN ATTD FELT STRONG VIB AND
FISHTAILING/SWING AS WELL IN GALLEY. ALL OUR IND
AND SYSTEM PAGES NORMAL. DIDNT FEEL LIKE NSW VIBE.
HAD MOMENTARY AMBER MASTER CAUTION FLASH.
NO ECAM THO. ALSO TRIED TO RING YOU ON SATCM AND
NOT CONNECTING ON EITHER.
DID YOU GET ANY INDICATIONS AT YOUR END.
ALL VIBRATIONS NOW GONE

51928073 LCHC DURING CLIMB BETWEEN 1000 AND 10000 FT A ORDF

Text DURING CLIMB BETWEEN 1000 AND 10000 FT AS A/C ACCELERATED FROM 250 K TO

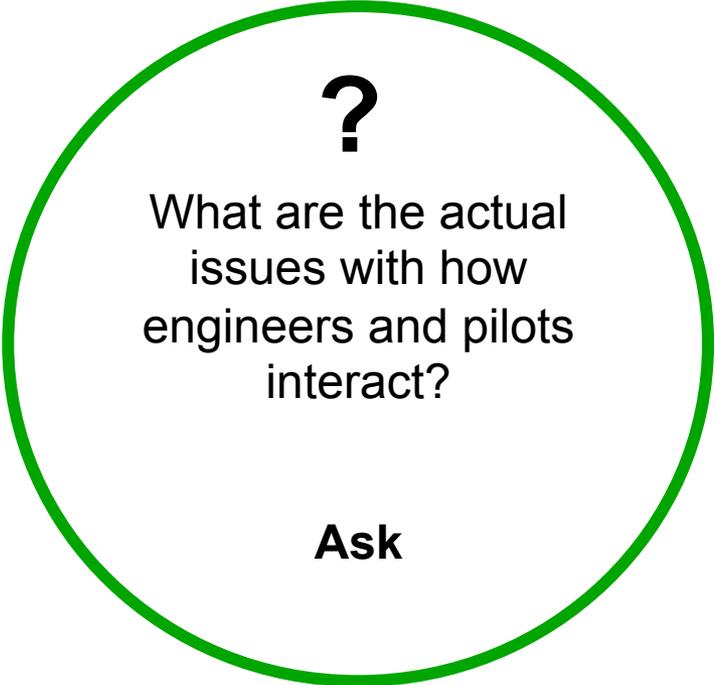
- 300 K A MODERATE VIBE FELT THRU RUDDER PEDALS AND COCKPIT FLOOR. REAR
- CABIN CREW NOTED VIBE AT REAR OF CABIN WITH SLIGHT LATERAL FISHTAILING
- MOTION. QUITE LIKE LDG LGHT VIBE BUT THEY SLOWED AS RETRACTED. NO ECAM
- OR ABNORMAL FLT CTL MOVEMENTS ON FLT CTL DISP. A/C SLOWED TO 260 K AND
- VIBE CEASED. N1 VIBE 0.5 , N2 VIBE 0.1.. OTHER ENG PARAM NORMAL. AP1 ENG
- AT TIME. MOC ADVISED AND ELEC VIBE REPORT SENT, MOMENTRY AMBER MASTER
- CAUT LATER BUT NO ECAM.

Strong → moderate vibrations

Strong vibration and fishtailing → slight lateral fishtailing

1000ft up to 16000ft → between 1000ft and 10000ft

Didn't disappear when airspeed reduced → vib ceased when slowed to 260k



?

What are the actual
issues with how
engineers and pilots
interact?

Ask

- 1a. What do pilots and engineers identify as impediments to effective communication between their two groups?**
- 1b. Are these impediments reflective of the barriers suggested by the Information Transfer Model?**
- 1c. If there evidence of conflict between the two groups, is this able to be classified as task-related conflict and/or interpersonal conflict?**



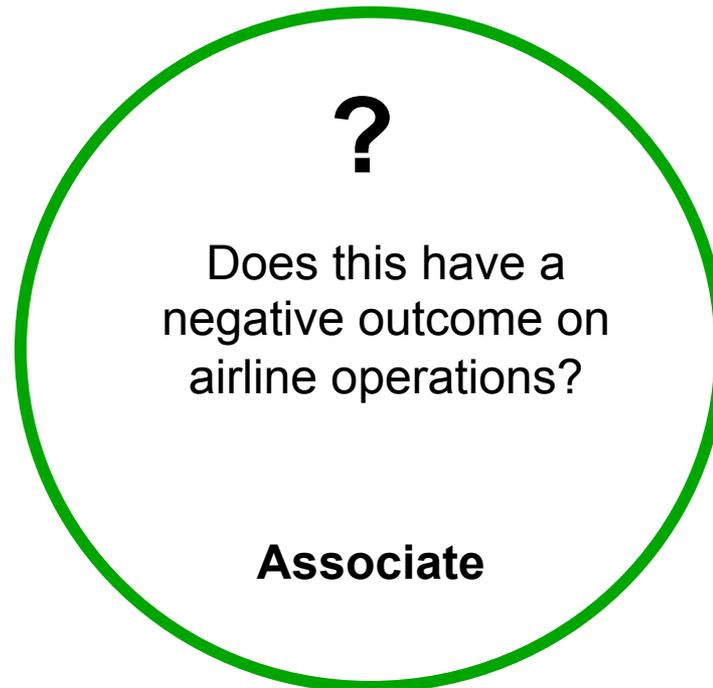
2. If disharmony does exist, to what extent does this influence the effectiveness in which the two groups communicate with each other?

- i) Is there evidence of task-related conflict during communication exchanges? If yes, how frequently does this occur?**
- ii) Is there evidence of interpersonal conflict during communication exchanges? If yes, how frequently does this occur?**

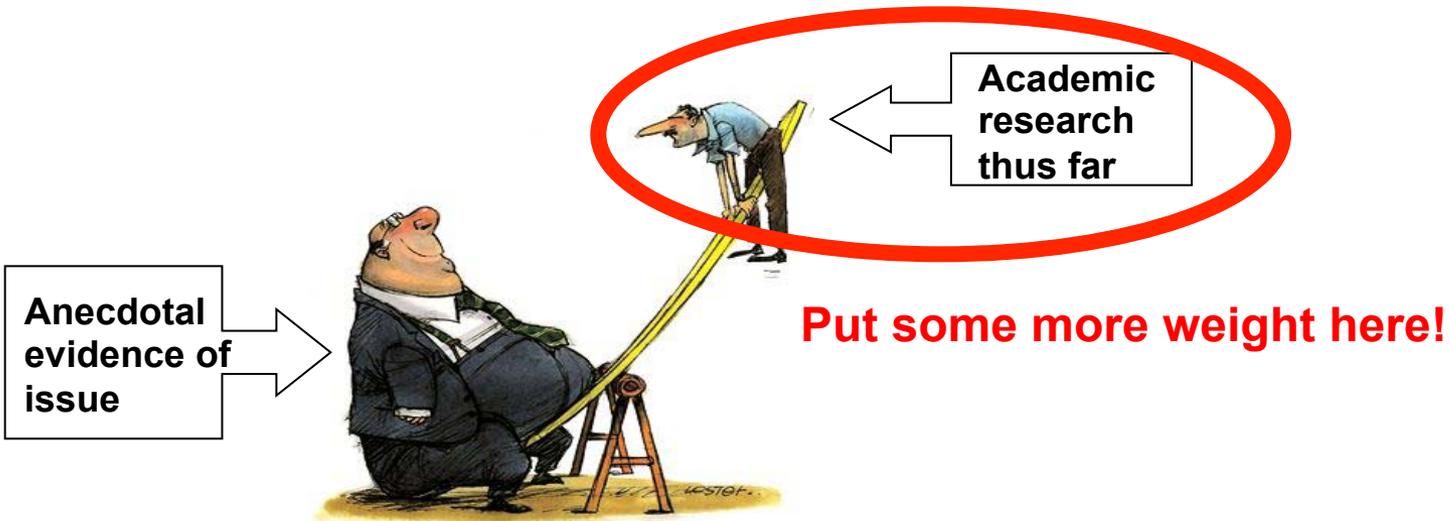
3. How do the impediments which were identified by pilots and engineers and, if present, any conflict between the two groups, affect airline operations?

i) Can interactions where identified impediments and/or conflict is evident be associated with events which negatively impact on aircraft despatch?

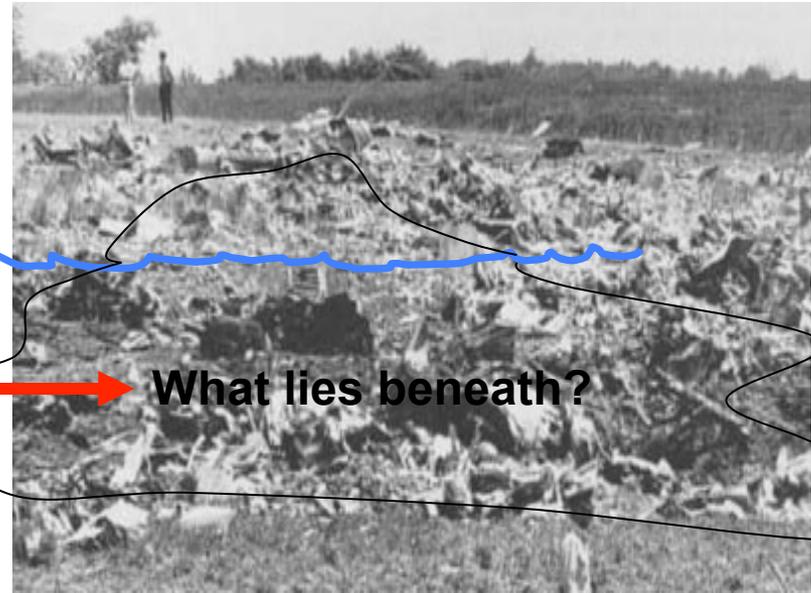
ii) Can interactions where identified impediments and/or conflict is evident be associated with events which negatively impact on aircraft safety?



Significance is twofold



Contribute to improvement here



What lies beneath?



Questions?

