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<th>Captains describing co-pilots...</th>
<th>Co-pilots describing captains...</th>
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<td>Competitive</td>
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<td>Over-confident</td>
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<td>Obstructive</td>
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<td>Obnoxious</td>
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<td>Bolshie</td>
<td>Unpleasant</td>
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<td>Difficult</td>
<td>Sarcastic</td>
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<td>Un-Cooperative</td>
<td>Over-critical</td>
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<td>Lazy</td>
<td>Pig-headed</td>
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<td>No sense of humour</td>
<td>Aggressive</td>
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<td>Complainer</td>
<td>Tyrannical</td>
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<td>Resentful</td>
<td>Authoritarian</td>
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<td>Minimiser</td>
<td>Incompetent</td>
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Cleared to Disconnect?

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

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 of issue

Academic research thus far
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
Which door? When exactly? Other indications? Did it stay on?

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

And a personal favourite....

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

Ask

Does this affect communication?

Identify

Does this have a negative outcome on airline operations?

Associate
Previous Key Studies
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)
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. DIDN'T 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
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

Anecdotal evidence of issue → Academic research thus far

Put some more weight here!

Contribute to improvement here

What lies beneath?
Questions?