

Crew Resource Management Evaluation Survey Summary

At the Australian Aviation Psychology Conference, in Manly, November 2000, a workshop was held on the subject of human factors training evaluation. This was organised by Professor Bob Helmreich (Aerospace Psychology Research Group, University of Texas at Austin), Captain Simon Henderson (Ansett), Captain Mike Lodge (British Airways) and Professor Rhona Flin (Industrial Psychology Research Group, University of Aberdeen). At this workshop, presentations were made of the LOSA – Line Oriented Safety Audit System (Helmreich); Ansett's Pilot Proficiency System (Henderson); and NOTECHS – European Behavioural Marker System for Nontechnical Skills (Lodge & Flin).

Aberdeen University were beginning a new project on CRM evaluation – i.e. what do organisations using CRM do to evaluate whether CRM training is having the desired effect. (This project is funded by the UK CAA and will run in 2001). During the workshop, participants were asked to complete a short questionnaire which asked them for details of the CRM evaluation techniques being used in their organisation and their opinions on CRM evaluation.

The workshop was attended by around 60 delegates, not all of whom completed the questionnaire. Those who responded were from the following airlines: Aerolineas Argentinas, Air New Zealand, Air Niugini, Ansett, Cathay Pacific, China Airlines, Emirates, Garuda, Lufthansa, Malaysia Airlines, Qantas Airways, Sunstate Airlines, Skywest Airlines, United Airlines. Responses were also received from other participants including regulators, military pilots, pilots' union representatives, air traffic controllers, trainers, consultants, and aviation psychologists. Some responses were anonymous or did not provide organisational details

A preliminary summary was calculated and fed back at the workshop. This report presents a fuller report, including verbatim comments, summarised into principal themes.

If you have any comments about this survey or about CRM evaluation, please contact Paul O'Connor, Industrial Psychology Research Group, University of Aberdeen, King's College, Old Aberdeen, Scotland AB24 2UB. tel. 44 1224 273212, fax 44 1224 273211

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A total of 30 responses were collated for Section I (airline or ATC experience of CRM) and 43 sets of comments for Section II from all workshop members (pilots, ATC, + trainers, consultants, researchers).

Section I

1. Reactions to CRM training

Is an assessment made of participants' reactions to the course?	Yes	29	No	1
If yes, how is this done (please tick the appropriate boxes)?	Reaction sheet	23	Oral feedback	10
			Other (please specify)	<input type="checkbox"/>
				2- see over

2. Attitudes

Is an assessment made of participants' attitudes to CRM?	Yes	14	No	16
If yes, how is this done (please tick the appropriate boxes)?	CMAQ	2	Company specific attitude questionnaire	9
			Other (please specify)	
				2 – see over

3. Learning

Is an assessment made of the extent of participants' knowledge after the CRM course?	Yes	9	No	20
If yes, how is this done (please tick the appropriate boxes)?	Multiple choice test	3	Written exam	2
			Oral feedback	5
			Other (please specify)	
				3 – see over
Is it possible to fail the test?	Yes	3	No	6
What happens if a pilot fails?	see over			

4. Behaviour

Is an assessment made of participants' CRM skills after the course?	Yes	16	No	13
Do you use a behavioural marker system to evaluate pilots' CRM skills?	Yes	11	No	17
What type of behavioural marker system do you use (please tick the appropriate box)?	LOSA	2	NOTECHS	1
			Company specific	16
When does the evaluation take place (please tick the appropriate boxes)?	On the line	3	Route checks	11
			Simulator/ LOE	21
			Other (please specify)	
Is it possible to fail this evaluation?	Yes	9	No	12
What happens if a pilot fails?	See attached			

5. Organisational Results

Is an assessment made of the effects of CRM training at an organisational level?	Yes	6	No	22
			Don't know	1
			Not yet	1
What method of evaluation is used (please tick the appropriate boxes)?	Company climate survey	3	Business performance	1
			Technical performance	4
			Other (please specify)	2
				To be introduced.

6. Other evaluation methods

Does your company use any other form of evaluation not described above?	Yes	3	No	25
If yes, please describe the method?	See attached			

Crew Resource Management Evaluation Survey. Section I Additional comments

1. Reactions to CRM training.

If yes, how is this done? Other (please specify)

- Student evaluation of teaching process
- Comprehensive de-briefing

2. Attitudes

If yes how is this done? Other (please specify)

- Course evaluation
- Personalised
- Safety questionnaire
- Pre-post training
- Feedback form

3. Learning

How is assessment made? Other (please specify)

- Part of audit process
- Specific test learning questions
- Observation/simulator

What happens if a pilot fails knowledge test?

- Resit – repeated fails – student unable to continue in course.
- Re-do + tutoring
- Resit.

4. Behaviour

What type of behavioural marker system do you use? Other (please specify)

- General observation

What happens if a pilot fails CRM skills test?

- Remedial training and re-assessment.
- Resit – repeated fails means student unable to continue in the course.
- Given a remedial CRM loft training
- Re-check
- Company special remedial training
- Re-training (mostly technical)
- Remedial training
- ?/Retrain/re-fly/counselling if required.
- Given one to one training.

5. Organisational Results

What method of evaluation is used. Other (please specify)

- To be introduced using Behavioural markers, July 2001.

6. Other evaluation methods.

Does your company use any other form of evaluation not described above?

If yes please describe the method.

- CLR topic list.
- Major problem to assess this.
- Workplace assessment regime.

Section II Responses to the two questions have been loosely categorised into themes.

1. What do you think are the best methods for evaluating whether CRM training has transferred to the flight deck?

OBSERVATIONS: LINE CHECKS/ SIMULATOR CHECKS /LOFT/ LOE

- Flight checks
- Observable behaviours during LOFT and line checks
- By structural evaluation during check flights and simulator checks.
- A LOE/LOFT exercise during simulator checks.
- QAR's, LOFT sessions
- Observe operational scenarios in SIM
- Observable behaviour during LOFT and line check scenarios.
- Some form of observation , on- line or simulator.
 - Scenario based LOFT – evaluated by trained evaluators in the simulators
- LOFT training
- Use LOFT incorporating situational judgement tests.
 - Behaviour observation in Simulators
- CRM evaluation in Simulator / line check
- Competency based behavioural assessments on the line to appropriate criteria through observation, coupled with other assessment methods both quantitative and qualitative (to be developed).
- Simulator LOFT/Los observation
- Short term – better crew cohesion, effectiveness of decision making processes, better monitoring of external situation, high level of commitment to improving safety. These should be assessed using situation awareness such as used in LOFT.
- Longer term – reduction in safety incidents, recovery from errors, use of preventative strategies. These could be assessed using observation of crew performance.
- Observations of LOFT and normal operations – amend against reliable validated markers.
- Precise checklists
- Behavioural markers which are used in all aspects of flight training i.e. TRG, simulator etc.

OBSERVATIONS: LINE AUDIT (eg LOSA, Helmreich et al)

- Line audit
- LOSA type activity
- Audit
- Line observation
- LOSA – behavioural markers
- Flight deck observers e.g. LOSA
- LOSA – feedback from crew.

INCIDENT REPORTS / CONFIDENTIAL REPORTS

- Review incident reports
- Reduction in incidents
- Incident analysis
- Either the lack of or increase of flight deck/ cabin crew incident.
- Confidential reporting
- Confidential human factor reports / training reports.

SURVEYS (Attitudes)

- Surveys

- Analysis of underlying attitudes and values towards CRM.
- Org cultural surveys of flight ops. Performance.

INTERVIEWS/ DEBRIEFING

- By informal feedback from line pilots delegated to the task of keeping their line managers informed of tone and trends on the time.
- Possibly interviewing/using questionnaires to obtain line crew feelings/observations.
- Feedback from Flight crew members re operational experience in flight debriefing.
- Aircrew retrospective self assessment e.g. quick questionnaire when signing off the aircraft
- Post-flight self report & debriefing by CRM qualified assessor. This will include flight check and cabin crew.
- Pilots' reports on difficult situations.
- Honest feedback

SELF/ PEER / 360°ASSESSMENT

- Peer evaluation
- Behaviour observation, self-assessment.
- Self report
- Crew assessment of other crew members
- 360 degree assessment technique
- We have not thus far had use of a simulator but soon will and will trial various methods. One that we are keen on is a video self-assessment discussion after the session.

OTHER

- Yes it xxxx reality
- Longitudinal evaluation (before/after)
- Long term performance assessments.
- Practical – CVR, video and unannounced check facility by company and regular approved pilots
- Random video taping of flight crews in ops. (not simulator). Post flight review with no use of in flight check crew assessors.
- Subjective (trainer and trainee)and objective measures required (look at kinds of errors made in training scenarios)
- IP/CP feedback
- Assessment in a non-jeopardy environment either by questionnaire or observation
- Assessment of normal day to day operation.
- Assessment of normal/abnormal occurrences in flight or in the simulator
- Direct and indirect observation of behaviours e.g. indirect via cockpit and video recorders.
- Measurement of error rates in the cockpit (pre and post training).
- Relationship between crew members – effectiveness, communication, empathy
- Validation in this moment but I need to know to do it.
- Multi model xxxx approach – Attitudinal assessment (pre and post training)
- Xxxx all observations
- Observe / record day to day flight deck activity
- Observe / record day to day flight deck activity or use post flight reports supplied by crew (first is preferable to 2)

2. What in your opinion, are the main problems related to the evaluation of CRM skills?

COMPETENCE OF EVALUATORS

- Training the observer
- Subjectivity
- Who does the evaluation
- Fear of subjectivity during evaluation of CLR
- The distinct possibility that the assessor may be less skilled than the crew being assessed in CMR e.g. check captains are frequently older and less adaptive.
- Assessor training
- Who evaluates? Problem is old ways are still second nature. An old style evaluator may be preferred by an old style pilot.
- Evaluators do not understand each CRM behaviour
- Who will be the evaluator? Chief pilot or training manager
- Training of the examiners, standardization
- Inter rater reliability
- Training instructors check personnel to use / observe correctly
- Proper facilitation/debriefing skills in evaluation process
- Observer training (standard)
- Subjective nature of some CRM skills
- Ensuring the evaluators are bog standard
- Who is doing the evaluation (trained)?
- Potential problems with inter-rater reliability
- Difficulty of training facilitators etc in assessment of technical skills
- Consistency
- Expertise of the assessors
- Training technically minded instructors in the soft skills of CRM behaviour evaluation.
- Interpretation by observer
- Standardisation between facilitators in utilising the evaluation tools being used.
- Subjectiveness in assessment.
- The intangible stuff – having people able to recognise and can assess this objectively.
- The subjective nature of the discipline.
- Subjective nature of subject.

QUALITY OF MEASUREMENT SYSTEM

- Valid (at company and industry level) markers.
- Require baseline measures
- Are they stage managed when under evaluation?
- Understanding the contribution of particular skills to safety and effectiveness.
- Not having a definable behaviour standard
- Describing gradation differences in CLR performance in a legally defendable manner.
- Assessment of behaviour in non-normal and high stress operations.
- No definable behavioural standard. i.e. problems in defining graduation differences in CRM performance in a legally defendable way.
- They must be handable in terms of number – only a certain number of makers can be handled by observers but actually you need a lot more markers to be precise when watching behaviour.
- How do you develop reliable measures
- Observation system (e.g. NOTECHS) validation
- Hard to observe real line-flight operation
- Behaviour not specified clearly
- Selection of criteria, definition of performance standards

- Is one check ride evaluation valid?
- Achieving an objective assessment.
- Analysing collected data
- Scoring/debriefing methods (lack of enthusiasm after a 1 am to 5 am simulation.
- If it is very subjective – possibly too subjective – a negative evaluation can be used as a stick with which to beat people.
- Positive evaluations are the norm and become a ‘benchmark’ that is automatically given.
- Getting a meaningful and truly representative assessment with someone looking at you.
- No set description for what is the minimum standard
- Needing to observe repeated performance i.e. over a long period of time, in order to validate and get consistency.
- Difficulty to access to 1 percent data – i.e. red line behaviours
- Difficulty of validating the real critical criteria to evaluate – what are the optimal required competencies.
- Observability of behaviour
- Ensuring natural behaviour by crew

PILOTS’ ATTITUDES/ ACCEPTANCE

- Culture attitude of pilot.
- Acceptance by crew that non-technical skills are important.
- It will be resisted forever if people perceive it to be a square filling exercise.
- Very grey areas which do not fit with pilots. Needs very practical methods.
- Acceptability to line pilots
- Acceptability to check captains or maybe willingness.
- Inability to commence evaluation at start of program due to acceptance by union groups
- Getting full co-operation from crew
- Getting full co-operation from crew to the observed/recorded
- Acceptance by the assesses

MANAGEMENT

- Involvement of management
- Assessment of management
- Lack of management support for the time and cost involved
- It is not clear that senior management at Airlines are well informed of the nature of CRM and its potential benefits. Is there sufficient awareness of the content of CRM at senior management level or do senior managers view CRM as some other aspect of technical training?
- Getting results in a time frame that is acceptable to management.

OTHER

- Only one course of action can actually be pursued. The rest remain hypothetical alternatives.
- Can you fail
- Should it be crew/individual
- A LOE/LOFT exercise during simulator checks.
- Training the trainers to be very conversant with CRM.
- It is difficult to monitor attitude changes throughout the pilot and F/A group over short term periods.
- Communication to staff of expected outcomes
- Finding market that can reflect accurately the levels of CRM skills.
- It is not a xxxx issue but behavioural / interface dynamics.
- No specific outcomes

- Trying to justify it on an analytical basis. It must become part of operational culture through example and flight expectations.
- Use of validated constructs in aerospace, land and sea environments i.e. CRM is not a concept restricted to aerospace and medicine.
- Is CRM a multi-phase development e.g. CRM intro, advanced, expert?
- Measures of individual vs measures of group.
- Attitude survey is indicative and not skill based - you have to evaluate actual behaviours not attitudes.
- Establishing a direct link between training and performance.
- Human factors are very difficult to be evaluated.
- In the context of CRM training and evaluation in the military there are aircraft where physical configuration or mode of operation make 'airline type' LOSA impossible.
- One of our challenges is to devise methods of gathering LOSA data without the benefit of having an observer in the jump seat.
- Cost
- Ensuring evaluation results /information is fed back to ongoing CRM training
- Ensuring CRM training is accessible to all aviation personnel but not through a one size fits all evaluation approach.
- The outcome of CRM need to be assessed across 3 levels ie. Individual, team and company. The process by which individual behaviour contributes to team performance needs to be explained.
- Balanced xxx requesting xxxxx and depth of information.
- Xxxx between CRM and technical skills
- Use for checking as well as training.

OTHER COMMENTS

Just a comment (constructive criticism) – there are too many areas of the airline where CRM programs are applied so it would be good to perhaps have a generic term such as 'operational environment' rather than 'flight deck'