



UNIVERSITY OF ABERDEEN

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**CRM Recurrent Training:  
Theory and Practice**

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# The Industrial Psychology Research Centre

University of Aberdeen



Welcome to the Industrial Psychology Research Centre. The centre specialises in the application of psychology to high reliability workplaces.

The group has worked with the oil industry since 1986, and regularly engage in consultancy projects. We are currently working with the offshore oil industry, civil aviation, nuclear power generation, surgery, emergency services, conventional power generation and transportation.



Interests of the centre include:

- Accident analysis
- Incident command
- Occupational stress
- Emergency decision making
- Crew Resource Management
- Measuring and managing safety culture/climate
- Human factors aspects of safety management and emergency response



Clients include: Agip, AKER Offshore (Norway), AMEC, Amerada Hess, AMOCO, British Energy, BHP, BP, Brown & Root, Chevron, Civil Aviation Authority, Coflexip Stena Offshore, Conoco Phillips, Defence Evaluation and Research Agency (DERA), EC (DGTREN), First Group, Halliburton, Health & Safety Executive, KBR, Kerr McGee, National Power, NHS, Powergen, Royal College of Surgeons, Salamis SGB, Schlumberger, SCPMDE, Shell, Talisman, Texaco, Total Fina Elf, Transocean Sedco Forex, UBS Warburg & UK Nuclear Imc.

## JAR-OPS / see CAA CAP 737

- Recurrent CRM training should:
  - cover all major CRM topics, at least once every three years;
  - include case studies eg same operator or same aircraft type;
  - address operational needs;
  - be based on feedback from assessment of CRM skills
- See also Griffith's paper this conference

# Recurrent training: Learning from other industries



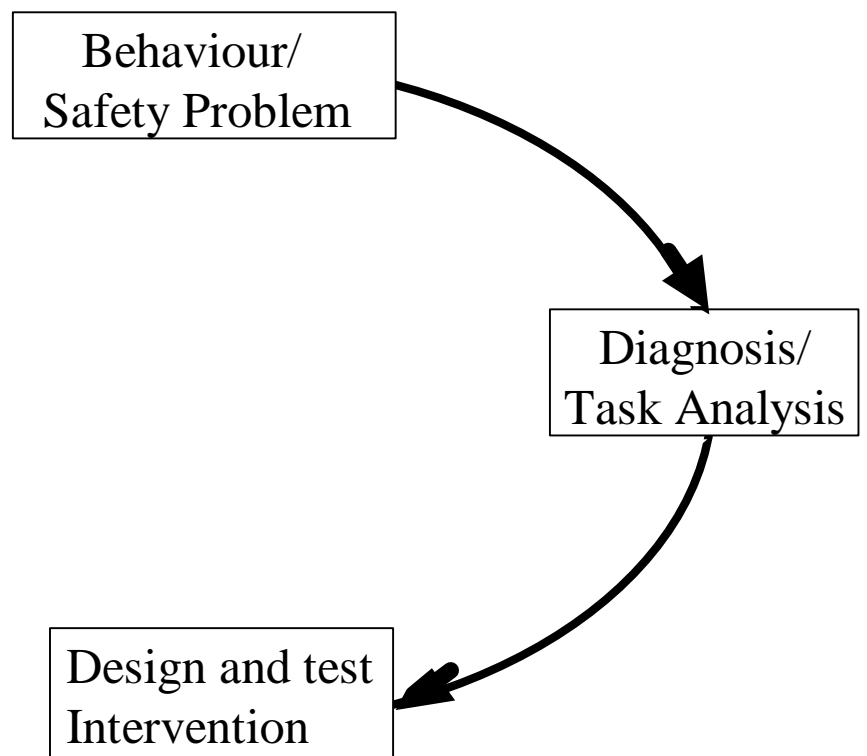
## Evidence Based Training

- Behavioural safety training (e.g. CRM) should be designed and evaluated with the same attention to evidence as technical training.
- Repeat training needs analysis
- Track effectiveness
- Tailored to enhance CRM skills for changing demands/ threats

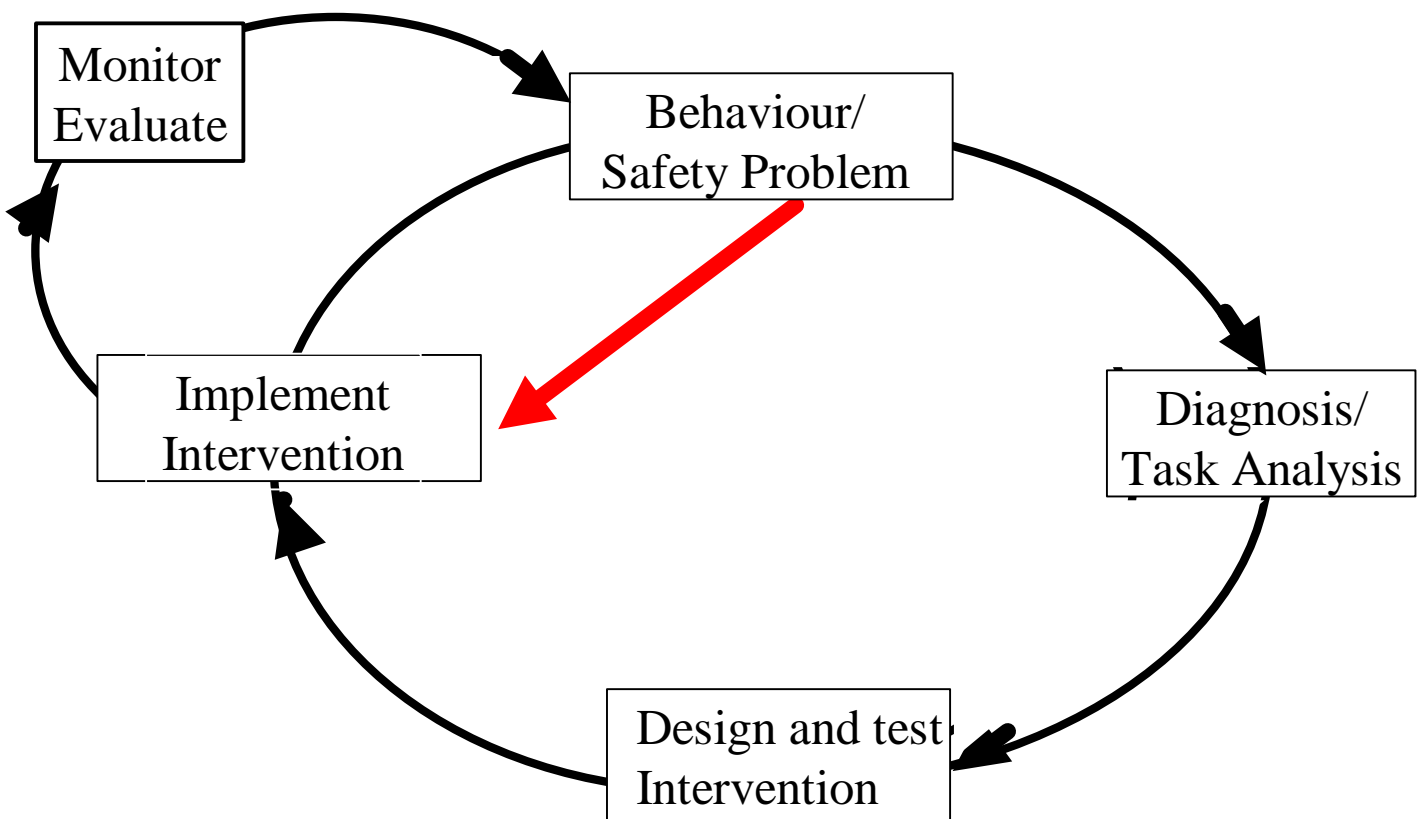
## Closing the Loop

1. Ongoing diagnosis – needs analysis
2. Design and redesign
3. Evaluate impact (ROI)

## ***Closing the Loop***



## *Closing the Loop*





# **A methodology for training design**

**(adapted from Goldstein & Ford 2002, Salas 1999)**

- **Determine training requirements**
  1. Identify operational requirements.
  2. Assess training needs.
  3. Identify existing competencies.
  4. Determine training objectives.
- **Design training method and materials**
  1. Determine content and training delivery method.
  2. Design scenarios and create opportunities for practice.
- **Training evaluation**
  1. Design assessment measures.
  2. Design and tailor tools for feedback.
  3. Evaluate the effectiveness of the training.

## Closing the Loop

1. Diagnosis of CRM skills to be included in recurrent training?

## CRM Behaviours – Diagnostic Techniques

- Task analysis / Cognitive Task Analysis
- Accident & near-miss analysis (on non-technical /human factors)
- Crew interviews and surveys
- Flightdeck and simulator checks/ observations
- Confidential safety reporting systems
- Organisational - Safety climate surveys eg Lufthansa safety survey – see Nebb paper this conference

## Identifying CRM skills for an ever-changing environment

- New aviation technology
- ATM changes – e.g. ‘free skies’
- Demographic changes to pilot population
- Emerging threats eg suicidal terrorism

## Closing the Loop

2. Design recurrent CRM training from identified skill needs / changing context

i.e. Evidence-based training

## CRM skill decay rate?

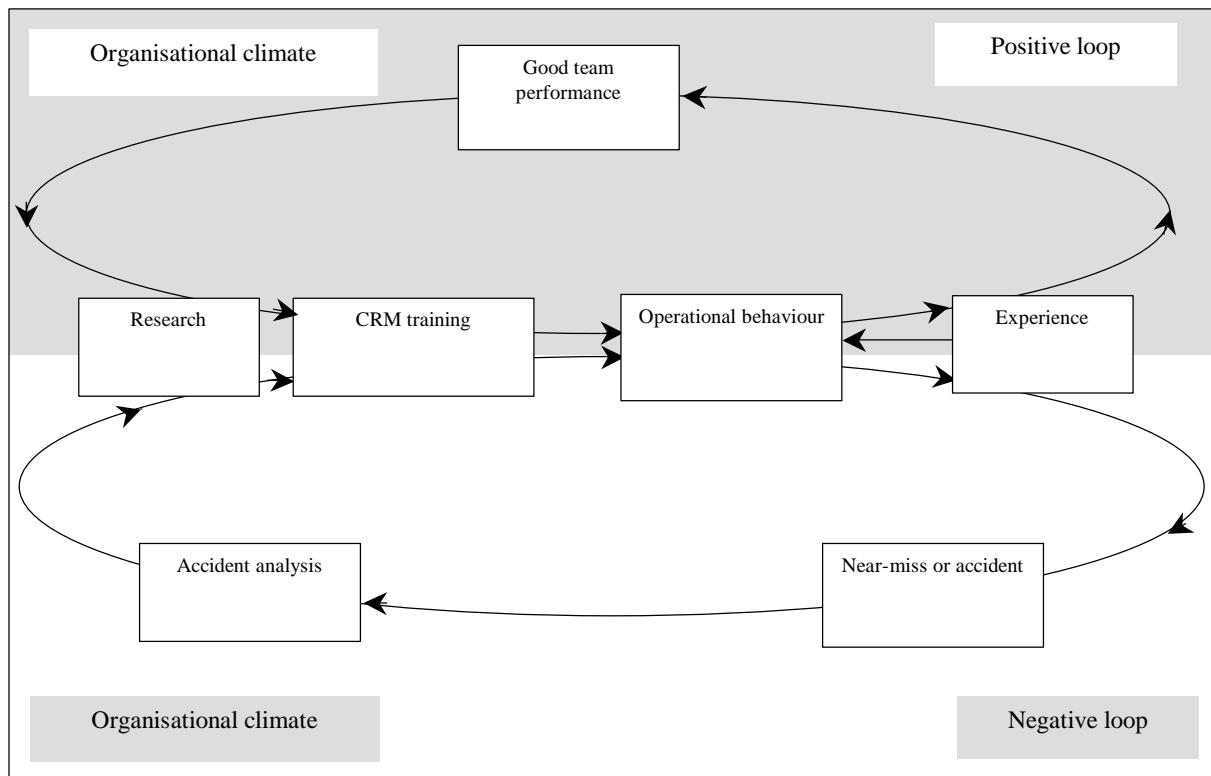
- Most skills will show some fade over time depending on levels of practice and feedback – so what is best retraining interval?
- Examples from operators, ½ day every year, 2 days every 3 years
- Irwin (1991) reported reduction in CRM attitudes after one year
  - recurrent training produced improvement
- Edkins (2002) Still few CRM longitudinal studies

## Closing the Loop

### 3. Evaluate training

What is the return on investment (ROI)?

# CRM evaluation/ development





## Training Evaluation Measures

- Participant feedback (course content and delivery)

### ***But has training transferred to worksite?***

- Skill tests – eg NOTECHS behavioural markers
- Interviews / questionnaires (attitudes, behaviours)
- On the job/ simulator observations
- Safety climate assessment
- Accident rates

# CRM training beyond the cockpit

## Maersk: CRM for ships and rigs



### Pre-CRM

**(1992) 1 Nautical casualty per 30 ship years**

**6.5 LTIs per million exposure hours per fleet**

### Post-CRM

**(1996) 1 Nautical casualty per 90 ship years**

**3.7 LTIs per million exposure hours per fleet**

**(1998) Reduction of insurance premium by 15% for fleet and offshore installations**

# Barriers to CRM evaluation UK Air Operators 2002

LACK OF: Time

Resources

Evaluation tools

Expertise

Management support

O'Connor, Flin, Fletcher, Hemsley (2002 *HFAS*)

## Benefits of recurrent training

- Skill enhancement
- Improved skill fit for changing environment
- Feedback opportunity

## Evidence Based Practice?

- Behavioural issues relating to safety should be diagnosed, designed and evaluated with the same attention to **scientific knowledge** as engineering applications.

BUT

- ‘Why let a few facts get in the way of a good story’

## References

- Edkins (2002) Review of benefits of aviation HF training. *Human Factors and Aerospace Safety*, 2, 201-216.
- Goldstein & Ford (2002) *Training in Organizations*. Wadsworth.
- Irwin (1991) Impact of initial and recurrent CRM on attitudes. Sixth Int. Aviation Psych.conference, Ohio.
- O'Connor, Flin, Fletcher & Hemsley (2002) Evaluation of the effectiveness of flightcrew CRM training. *Human Factors and Aerospace Safety*, 2, 235-255. Also CAA research report.

# Thank you

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