An introduction to Crew Resource Management (Human Factors) Training

by Captain John Wright
Collision between a KLM Boeing 747 and a Pan Am Boeing 747

Tenerife,
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CRM Background
CRM Course Objectives

Crisis

Excess Stress

Normal

DMI
Sea Empress
Human Error and Accidents

Accidents caused by human error?

80%

20%
Underlying Causes of Accidents

Organisational Culture

Hardware

Training

Error Enforcing Conditions

Defences

Incompatible Goals

Communication

Procedures

Design

Maintenance Management

Housekeeping
Accident Triangle

2,000,000 Unsafe acts

240,000 Near misses

20,000 Minor injuries

400 Reportable Injuries

1 Fatality

Data sources: Heinrich, Bird, HSE, John Ormond
Near misses are always reported here

- Yes
- Not sure
- No

Percentage

Manager
Supervisor
Workforce
Sometimes it is necessary to take risks to get the job done.
Accidents can be triggered when critical errors remain undetected and uncorrected.
Synergy

Acting in a synchronized manner and supporting each other

Requires high levels of coordination, support and understanding
Synergistic Team: The Ideal situation

Everybody singing (playing) from the same song sheet!!
Catastrophe

1+1 = -250!!
The style depends on the ratio between the leader’s authority and the team’s assertiveness.
The Practical effects of Errors

Individual reliability and system safety

The effects of an error depend entirely on the structure of the system in which it occurs

Two main characteristics:
- visibility (error detection)
- error tolerance
The Role of Management in the Injury Rate

• Injury rates depend on the strength of the Safety Culture
• Management decides the safety culture they want either consciously or by default

So Management decide the injury rate
Visible

Attitudes
Beliefs
Values

Hidden

Behaviour
Actions
Your stress Jug

Forgot security pass
Get Caught for speeding
Traffic Jam
Car won’t start
Get up late
Performance by Time of Day

Performance can drop in tune with the PLD
Sleep

Lack of sleep can reduce our ability to:

Communicate by 30%

Make valid judgements by 50%

Remember facts & figures by 30%

Keep our attention by an alarming 75%
The Importance of Effective Communications

Primary Causes of 119 Fatal Accidents

- Procedures
- Maint.
- Design
- Communication
Communication

- Body Language: 55%
- Way: 38%
- Words: 7%
Communication Blockers

Workload Versus Listening Capability

![Graph showing the relationship between workload and listening capability](attachment:image.png)

- **Workload** (red line)
- **Listening** (blue line)
Short Term Memory

**Definition:** STM, or working memory, is the store where essential information relevant to the current situation is retained only for a short period of time.

It is also the entrance to, and the exit from, long term memory.

Used as a mental blackboard.

**Major drawback:** Storage capacity is limited. Information held in STM is sensitivity to interruption and can easily be lost.
Decision Making - Key Elements

- Make a DIAGNOSIS
- Consider the OPTIONS & Consequences
- Make a DECISION
- ASSIGN Tasks
- REVIEW your decision
Confirmation Bias (Mind Set)

You have a mental picture of what is expected, when the glaringly obvious is there in front of you but still the mental picture wins.

This is the most dangerous bias. It effects our ability to objectively review whether the decision taken is indeed the correct one.

It’s not me that’s wrong, it’s the real world that’s wrong!!
The Costs of Accidents at Work

Why should safety be ranked equally with all other management objectives?

Insured Costs
- Employers liability
- Third party liability
- Co-operate liability
- Property damage

Uninsured Costs
- Product & material damage
- Plant & building damage
- Tool & equipment damage
- Legal costs
- Clearing the site
- Temporary labour & additional overtime
- Clerical & investigators time
- Fines
Economics of Management Control

Intangible costs due to failure include:

Loss of business image
Loss of customer satisfaction
Employee morale
Goodwill
Reduced productivity
Piper Alpha 1988
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