Human Factors in Helicopter Operations

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The problem

• Where I left off last time

• Analyses show human factors issues
  – Pilots keep making errors of judgement
  – The culture is *can-do*
  – Situation awareness is lacking in dangerous situations

• The problem is - The Helicopter
• We can use helicopters to do things we can’t with anything else
The ‘Old’ Approach

• Classical model has accidents caused by immediate causes
  – The model is one of a chain of events
  – The assumption is that breaking the chain anywhere will produce safe outcomes

• Technical failures
  – Things break
    – Design parameters are exceeded

• Human errors
  – People do what they should not have done
  – People do not do what they should have done

• If people only did what they *should* do, we wouldn’t have a problem
Human Factors in the Old Model

- **Vigilance**
  - Sleeping on the job
  - Not looking out for the obvious dangers
- **Competence**
  - Not being good enough to perform the task
  - Not trying hard enough
- **Attitude**
  - Non-compliance
- **The solution to these problems are simple**
  - Training
  - Procedures
- **If I see these as solutions being proposed I immediately suspect the use of the classical model**
The Systems Approach

• End of the 80’s it became clear that accidents were caused by people in situations that were not always of their own making
• Problems were lying around waiting to catch people
• The critical factors are not usually determined by those performing the task
  – Who decides how much training to give people?
  – Who writes the procedures?
  – Who says “get the job done”?
• Accidents are multi-causal – the individual at the sharp end may be victim as well as final cause
• Removing one failure leaves all the others
The Bow Tie

Management System
Tasks, Procedures, Responsibilities, Documents

= Risk Critical
SAFETY MANAGEMENT
Based on the Reason Model

Hazard/Risk

Barriers or Controls

Undesirable outcome

World

Work & Organisation
Level 0

• Level 0 is the basic representation of threats, top event and consequences
  – The Risk environment
• We identify the possible threats and consequences
• No barriers yet
  – These are how we control the risks
Level 0 – $L_0$
Level 1

• Level 1 adds the barriers and controls on the threats and before consequences
• $L_1$ barriers are *only* those that apply to prevent progress *at the time of the event*
• At $L_1$ pilot error is a correct description of an incident (but ...)
L₁ threats

- Production pressure
- Time pressure
- Weather
- Routes
- Variability
- U/S items off MEL
- Specific local problems
- Etc

• *These are what pilots and engineers manage*
Constraints on $L_1$

- At Level 1 training and procedures are *not* barriers – the view of the Old Model
- The barriers at this level are specific to the individuals at the time
  - what training delivers (a specific skill or knowledge) to prevent or minimise a problem
  - a specific procedure that should be followed
  - A design that controls a threat, provides information about problems etc
Level 2 – $L_2$

- Level 2 adds escalation factors and their associated defences
- These escalation factors are actually threats on the $L_1$ barriers
  - These are what put holes in the cheese
- $L_2$ escalation factor controls are organisational controls
  - Training programs, up-to-date procedures, human factored design, maintenance management
L₂ threats

• Poor design
• Inadequate procedures
• Procedures not being used
• Incompatible goals
• Poor communication within company
• Lack of appropriate training
• Inappropriate maintenance regime
L₂ barriers

• Provision of training
• Correct procedures
• Planning
• Protocols for communications
• Maintenance management system in place
• *These are what management does*
Why do L₂ barriers fail?

• There are threats on L2 barriers that make them fail
  – Maintenance delayed
  – No critical revision of procedures
  – Culture of non-compliance
  – HSE not No. 1 in organisational priorities

• This is the level at which cultural and regulatory factors operate
  – These make people do what they would rather not do
Level 3 – L₃
Threats and barriers

• This analysis shows that threats target a loss of control at all levels

• $L_1$ threats are managed by front-line operators
  – Pilots, maintenance engineers

• $L_2$ threats are managed by supervisors and line managers
  – They create the conditions under which people work
Level 3

• $L_3$ threats are managed by senior management and regulators
  – These threats put holes in the organisational support for $L_2$ barriers

• This is the organisational culture set by senior management
  – What we accept as normal ‘round here’

• Regulators (or Head Office) can force organisations to do the right things anyway
The Solutions

- Safety Management Systems
- Safety Culture
  - Ensures people believe the SMS is worth it (TC)
- The two can be brought together
- This will work for commercial organisations, but will be more difficult for private individuals and small GA operations
The HSSE Culture Ladder

- **GENERATIVE** (High Reliability Orgs)
  - HSE is how we do business round here

- **PROACTIVE**
  - Safety leadership and values drive continuous improvement

- **CALCULATIVE**
  - We have systems in place to manage all hazards

- **REACTIVE**
  - Safety is important, we do a lot every time we have an accident

- **PATHOLOGICAL**
  - Who cares as long as we're not caught

Increasingly Informed

Increasing Trust and Accountability
Safety Management System
A framework for Safety Management

No Structure

Structure
Generic HSE Management System (Shell)

1- Leadership and Commitment

2 - Policy and Strategic Objectives

3 - Organisation, Responsibilities, Resources and Standards

4 - Hazards & Effects Mgt (Risk Mgt)

5 - Planning & Procedures

6 – Implementation, Monitoring

7 - Audit

8 - Management Review

Corrective Action

PLAN

DO

CHECK

FEEDBACK
But!!

• This is all fine for professional pilots and professional operators
• The current problem is the small operator
• Amateur pilots probably make the difference between where we are and what we want to achieve
Small Operators - GA

• Most small operators get away with it

• They ARE the management, so they cover both L1 and L2

• They are probably Pathological
  – Strong belief in their own abilities
  – Resentment of regulations
Private Pilots

• Private pilots can afford their own helicopters
• They are like GA but more so
  – GA may be professional
  – Private pilots are amateurs
• They operate with minimal compliance
  – Who are you to tell me what I can do?
  – They don’t believe it will happen to them
Which drivers for which culture?

- **Pathological** respond to regulation
  - They don’t know the rest or it won’t happen anyway
  - They may be shifted if they are confronted with the costs
- **Reactive** respond to ethics, laws, regulation and accident costs (everything!)
- **Calculative** respond to regulation
  - They may be ethical but regulations and systems are they way they succeed
- **Proactive** respond to costs (as lost benefits)
  - Regulations are seen as defining minimum requirements
- **Generative** respond to benefits and self-image
  - They see it as strange if you don’t have HSE as a priority
What can you do?

• Answer the question – What’s in it for me?

• Strong persistent regulation
• Healthy fear of the consequences
• Belief that all this stuff is worth it

• Creation of a professional attitude
• Persistent and supported attention to detail
Who can help?

• The Regulator
  – Make them do it properly or take away their licenses
  – Set higher standards and requirements

• The manufacturer
  – Knows who they are
  – Can create a community of equals

• Family, Friends and colleagues
  – Social pressure is effective
  – They need to know what is important
Conclusion

• Professional organizations will respond to the disciplined application of standard methods
  – Pressure from clients and regulators works
• General Aviation is harder to reach
  – Regulation has to be persistent
  – They need to see commercial advantage in safety
• Private operators are the hardest
  – They take no telling
  – There are ways to approach them