



Error Management Systems Australia

Red Flag®

A Risk Management System

User Guide

Valid to 31 July 2007

Update to follow

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Red Flag[®]

Practical Risk Management

This *User Guide* introduces a simple and effective Risk Management tool known as **Red Flag[®]**.^{*} The chances are that by now you have been well and truly introduced to the **System**. From that background, this *Guide* has four purposes.

- The first is to discuss use of the **Checklist**. It's really a self-evident instrument, but your knowing its key design elements will make you more inclined to use it routinely.
- Secondly, additional materials are included to broaden and reinforce your understanding of **Red Flag** concepts. That is regarded as necessary as the **System** is not only innovative; it verges on the revolutionary. For instance, how many safety systems have you run across that ask you to actively engage with them daily?
- One concept that merits repetition is that of **Mutual Support**. Like so much of the **Red Flag System**, it is imported from the world of Air Force fighter pilots. In this case it is invoked as a set of **overlapping defences** against error. That is, the separate parts of the Kit, together with the Website, act as a team, each supporting the others.
- Finally, it contains the **Diary**. This is a vital element of your personal **Red Flag System**. It is your **Certificate of Accomplishment**, the record of activity the completeness and integrity of which presents evidence that you are maintaining your **Red Flag** status.

Red Flag[®]

What Makes It Work?

At the individual level, **Red Flag** takes effect by acting as a catalyst to render decision more reliable. It is designed for use in anticipation of critical situations, especially those involving stress. However, as a *skill-based* system, it must be continuously practised (and activities recorded in the *Diary*).

- Anticipation. You can't manage a decision unless you anticipate it. Your sense of *Situation Awareness (SA)* enables pre-consideration of acts of choice. SA skills are identified in Red Flag training, as are exercises to strengthen them.
- Recognising Criticality. Equally, your Situation Awareness permits you to classify pending decisions and recognize those warranting additional management and care. Case Studies reveal the truth of accidents – too often decisions are made without due care.

In systemic terms, **Red Flag's** full potential is realised when it is operated within a *managed system*. Most organisations have at least one “safety system”. It may be the obligatory workplace health and safety scheme, or it could be a QA system, and either or both may be active or inactive. There is no assumption that an existing safety system has shortcomings. Integrating **Red Flag** may be just another exercise in continuous improvement. It can also be catalytic, enlivening systems that may have lost effect over time.

Red Flag's effect is delivered through a formal procedure to *enhance Situation Awareness at the point of decision*. A “wake up call” is delivered ahead of decision (even when the act of choice may not be regarded as significant at the time). Decisions made at higher alertness states are more dependable. Techniques for invigorating alertness and awareness are taught in the training program. (That begins in your second month, being preceded by self-review activities and exercises.)

The **Red Flag** User Guide – and the System itself – are presented as do-it-yourself challenges and programs. That has drawbacks. Neither a safety tool nor its host system can be credited with accident-prevention effect without training – initial and continuing.

- As **Red Flag** operates at the personal level – as an aid to decision, accessible and task-relevant at all times – users must be trained to be able to benefit fully from its potential.
- Skill-based training requires continuing commitment. Concert pianists don't walk on to perform without having practised, and you wouldn't want to be a passenger of a pilot who only flew once a year.

You may have done well in your self-administered training – and that will have produced safety benefits in terms of improving your Risk Management competency. However, external training will produce even higher levels of safety expertise. **Red Flag Workshops** will be conducted from time to time. Details will be published on the website well in advance.

Red Flag design principles and concepts, and its practical features, have been extensively reviewed, by large numbers of aviation industry experts, from highly experienced veterans to neophytes, operating in every conceivable field. Responses vary from solid agreement to enthusiastic approbation. These people have attested to its potential worth. You should be able to gain from its adoption. (Ask your underwriter.)

* The copyright symbol will be dropped from here on.

Caution

Red Flag and Fit to Fly advocate physical exercise. Improved fitness reinforces stress resistance and enhances decision potential. If you feel encouraged to work out more, do it, but follow the usual steps. Get checked out by doctor or fitness professional, and proceed under their guidance. (It's just sensible Risk Management.)

The **Red Flag** system has been produced by Error Management Systems Australia with support from Aviation Australia. <http://www.aviationaustralia.net.au>

QBE Aviation has given enormous encouragement and extensive support to its development.

But in the end, it's my baby. Please direct queries to Doug at dougwds@bigpond.net.au

Red Flag

Practical Risk Management

Why **Red Flag** is needed

Risk Management has a “flavour-of-the-month” redolence, having become ubiquitous in recent years. (As, indeed, it should be. Efforts to minimise harm and reduce error rates are beyond reproach.) However, its theory does not readily translate into practical application.

Red Flag is different. It originates in the observation that conventional Risk Management theory and practice – as it is commonly taught – has little operational application in aviation (and other fields, for that matter).

Aviation practitioners certainly report difficulty in translating sound and sensible theory (eg, as contained in the Australian Standard AS/ANZS 4360:2004) into operational, day-to-day practice, of immediate application at the instant of need. Comments to this effect have been received from maintenance engineers, air traffic controllers, flight crew, aircraft loaders, aerodrome managers, fire and rescue crews – indeed, all front line staff. **Red Flag** overcomes the *practicality* problem.

Origins & Relevance

Reasons for the (commonly espoused) theory’s lack of direct connection with workplace reality are not hard to uncover.

In Peter Bernstein’s delightful book – “*Against the Gods*” the author notes that the word “*hazard*” comes to us from the Arabic “*Al Hazr*”¹. It means “*Dice*”. In other words, and Bernstein explains this at length, ***Risk Management theory originates in gambling*** – the origins of Risk Management were stimulated by players’ desire to gain advantage at the gaming tables by calculating the odds. (A hopeless quest, of course.)

It’s probably fair enough that a system that started in random risk-taking – gambling – still carries with it some vestiges of its origins. It’s imprinted in its DNA so to speak. However, Risk Management in critical decision-making should be little more than a roll of the dice.

Bernstein is a futures trader, stockbroker and investment adviser. That throws more light on the principal influences on the evolution of Risk Management doctrine. *It has been custom designed for operatives in the finance (and related) industries*. It naturally reflects, primarily, their needs.

Insurance companies are a classic example. They bank large chunks of premium income. Claims are paid. A suitable profit margin remains in the account at year’s end.

Insurance managers perform a financial balancing act based on actuarial calculations. That is, previous years claims set the direction for current and future year premiums and fees.

They need to get the income-payout balance right over the typical loss profile cycle. If it’s about weather-affected operations, the cycle is 5-7 years, to take into account variables such as one cyclone season being worse than another. And so on.

Implicit in traditional Risk Management theory, therefore, is the concept of ***tolerable loss***. That is, loss is normal. You plan for it. To the extent that prevention is an option, it is not the

¹ There’s another intriguing connection with Arabic; numerals. As Risk Management is a discipline relying heavily on arithmetic, it only became possible after universal adoption of Arabic numbers. (Try complex long division or multiplication using MDCCLXXVII etc..) So it’s only been around for 800 years or so.

primary consideration. Covering losses is. Calculation based on actual experience enables premiums to be adjusted continually to offset the cost of losses.

Medical insurance highlights this odd doctrine. Practitioners are taught (if they are taught anything about their insurance environment) **Claims Management**. In short, if you accidentally harm a patient, your aim is to ensure that person does not make a claim. Let them know what happened. Talk it through. Be a part of the recovery plan. People don't sue the person who came to their aid in peril.

It works. Writing in the New Yorker magazine of 14 November 2005, an American surgeon reveals that 98% of medical accidents (in the US) do not result in a claim. An Australian surgeon tells me it's about the same here.

Furthermore, 4 to 5% error rates are regarded as acceptable. The surgeon says he operates on 400 people a year. 16 to 20 of them will be injured. That is, they'll be harmed more than the operation itself required. It may be a damage to a critical nerve, or even a wrong diagnosis. Surgeons admit they sometimes get things wrong. And as long as it's within the limits it's acceptable.

Aviation Needs Differ

Aviation's equivalent to financial loss or medical blunder is an accident. The chance of avoiding harm is slight. Arguably, the only ethical standpoint is that a loss is **intolerable**. It's a moot point. Some say that mishap can't be avoided and that, while aviation is undeniably a hazardous activity, it is so well defended that the probability of mishap is remote – negligible even. (That's what gets passengers into planes.)

Red Flag does not conform to the **acceptable loss** theory. The **System** is based on **zero tolerance** to loss (or risk of loss). To argue that failure is inevitable is to confuse objectives with the means for their attainment. An objective is something you aim for. You may not get there, but to set zero failure rate as the objective is the only way to maximize effort and resources in its attainment. To accept a lesser standard is to permit weaker safety defences.

A prominent Risk Management reference lists five levels of severity-of-outcome arising from a mishap, starting with "multiple fatalities". The *second lowest* level cites an injury requiring hospitalization. By way of contrast, **Red Flag's** design criteria include the proposition that no injury, harm or hurt is tolerable. It's an aim point to clarify issues at the instant of need.

Another area of variance is failure fully to account for the **human factor**. The poker machine will, over time, return a set percentage of the money it swallows. All casino games do, by law. The person pressing the buttons does not affect the odds. Their state of mind – stressed, disabled by a drug – is not a factor. The machine decides the consequences (cash returned). Decision-making in aviation is directly related to consequences – and often affected by state of mind. Bookies and the money market act pretty much the same – independently of the clients mental state. We need Risk Management systems that admit that.

I am often challenged on my advocacy of **Zero Tolerance to Risk**. "You cannot achieve zero risk," they say. Well, that's not quite what I mean. Risk only exists in relation to the objective. If a zero risk approach to achieving the immediate aim is possible, obviously, you take it.

When that's not the case, the ultimate decision, like all decisions, is binary – a choice between two options. It's rare that one is not less risky than the other. Zero tolerance means that you always take the lower risk route.

An example: We know that drug and/or alcohol effects in a person render them unfit for work. Plainly, it is a hazard. Some organisations test randomly. Yet a zero risk option exists – test daily. To argue that such a regime would be too costly is to ignore low cost measures – eg, an eye-hand coordination test taking 5-10 minutes – that can be performed before the person signs on, as a condition for commencing duty.

*The **Zero Tolerance** policy repudiates "affordable safety" and "ALARP".*

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Red Flag[®]

Simplicity, Reliability & Zero Tolerance

Risk Management references often use tables or matrixes to show varying risk levels. On one axis, the “likelihood factor is spread out over 5 or so levels. The other axis contains reference to various levels of severity of consequences.

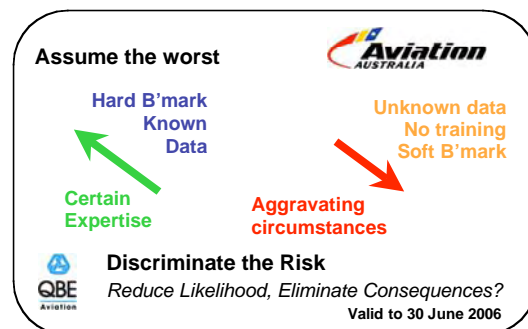
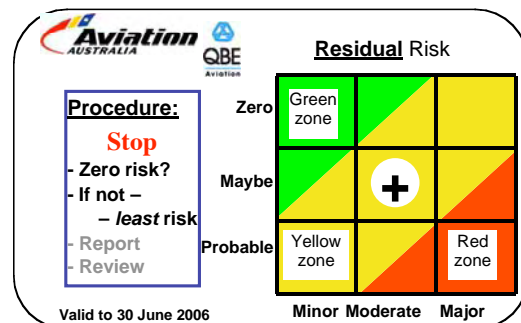
Red Flag cuts to the quick, for simplicity’s sake. Noting that decision is binary – that is, in the end, the choice is between “do it” or “don’t do it” (Yes/No) – it starts with just 2 levels of likelihood and consequence.

Admitting that doubt often precedes decision, a third level is introduced on each axis. (In the accompanying Checklist, the matrix is colour-coded.)

Use of the tool is detailed in following pages. Its design reflects these principles:

- The assumption is that “don’t proceed” (eliminate the risk) is not an option.
- Decision is binary, but we generally start “in between” – in doubt.
- Choice is always between 2 options, so one must be, if not zero risk, then lower risk.

Finally, as training is such an essential value-adding component of the system, it must be updated continually. A *Red Flag Kit* is valid for one year.



Red Flag

Practical Risk Management – Using the Checklist

You have a copy of the Checklist and may have noted that it is pretty well self-explanatory. Here are few thoughts on the concepts involved:

- The Checklist is carried at all times you are on duty.
 - **Red Flag** is a Risk Management system.
 - Risk Management operates at the individual level, relying on personal competencies and “fitness”.
 - High fitness state = low error potential. (Fitness can be measured.)
- Operating Principles are under the cover page. They include:
 - The system relies for its effectiveness on initial and continuing training.
 - That is, no form of assurance (say, to an underwriter or employer) can be given by **Red Flag’s** managers without continuing evidence of satisfactory application to training challenges.
- Decisions that are not thought through are potentially hazardous.
 - Instantaneous decision can only be unconsidered.
 - A defence against that hazard is to speak your decisions out aloud.
 - **Red Flag** operates preemptively, so the actual decision is preceded by a review of the Situation – update your Situation Awareness – also spoken aloud. (It’s a “wake-up call”, stimulating arousal.)
- At designated times, or under defined circumstances (different workplaces have different needs), **Red Flag** is activated as a process.
 - You say aloud – “This is a **Red Flag** situation,” and state reasons why.
 - If applicable, other parties are informed (eg, Air Traffic Control, supervisor).
- Speaking aloud informs the rest of the crew.
 - It also ensures you do not make an instantaneous decision.
 - When alone, you should still speak your Situation Awareness appraisal and decisions aloud.
 - Activating the “audio channel” improves decision reliability.
- A **Red Flag** situation must be conducted daily.
 - Mandatory **Red Flag** situations are written into work instructions.
 - Examples:
 - The Situation is not comprehended by procedures – suggesting that a non-standard procedure must be adopted.
 - An emergency occurs.
 - You suspect fatigue effects in yourself or another.
 - Undue stress is being experienced.
 - When practicing for a Red Flag situation (it’s a good idea to do it often):
 - You say aloud: “This is a **Check Flag** situation.” (Avoids adaptation.)
- A brief report is entered on the website after any **Red Flag** situation.

Red Flag – Initial Procedure

- The hazard noted, the **Red Flag** Situation is declared.
- Routine is suspended.
 - The fact of doing so is announced to appropriate people or agencies.
- An appropriate “wake up” alertness procedure is conducted.
- The Checklist is consulted and followed.
- Decision made, the **Red Flag** phase is declared closed.

Red Flag Design Considerations

The remainder of the Checklist is self-explanatory (and more so after training). You do not need to consult it during a **Red Flag** exercise, but use it as an *aide memoire* for reading and reflection at other (more relaxed) times. As a device for stimulating your understanding of such things as the need for “wake-up” calls and measures for enhancing decision reliability, a number of design conditions are either stated or implied in the later pages of Checklist. They include:

- The concept of “Hard” benchmarks for decision is applied.
 - Reference, for example, to numbers is more reliable.
 - Any decision made on “gut feeling” is inherently unreliable.
- Full effect from a **Red Flag** system is only possible when the incident and accident databases for the activity or activities being practised has been comprehensively reviewed.
 - The results of such a review or reviews is evident in the Hazard Register.
- The “operating health” of a Red Flag system is evident from reports.
 - Operating at the individual level, there are set daily, weekly and monthly exercises, all of which must be reported on the website.

Red Flag

Practical Risk Management – Self-Evaluation

Read Fit to Fly

Besides this User Guide and the Checklist, your **Red Flag** Kit contained a copy of Fit to Fly. Insight into the Checklist's aims and operation are provided by the introductory course, though self-reference is enough for basic application. Fit to Fly is another opportunity for self-administered learning. It is a book designed as a self-appraisal manual. There are two main underlying ideas: that some people are more error-prone than others, and that we are all more error-prone at some times than others (fatigue, alcohol consumption, etc.).

The ability to maintain Situation Awareness under stress is the critical competency in low error-proneness. Forms of testing exist that measure that factor, but they possess the inherent disadvantage of limited appeal to the "consumer". (They're challenging. "Is my career placed at risk by this?") However, everyone can self-assess. Fit to Fly will help you do it. After, you can decide if you need to seek higher levels of "cognitive fitness".

Fit to Fly also sets out to persuade you to exercise more, physically and cognitively. Fitter people are better at decision, especially under stress. Training and exercise render you less prone to error, and physical training has the happy byproduct of improving cognitive fitness at the same time. However, as the author, I'm obviously prone to touting its merits. To give you more objective views, here are two independent reviews:

If the Book Fits

A review of • FIT TO FLY — Cognitive Training for Pilots, by Doug Edwards

(Australian Flying September/October 1997)

There are two kinds of pilots, they used to say: those who have already landed with the gear up, and those who will probably do so tomorrow. Several generations of air accident investigators have successively used differing names for the same phenomenon, the commonest being "the-it-can't-happen-to-me" syndrome.

It's certainly true that (apart from premeditated self-destruction) no true air accident was ever anticipated by the pilot. Yet one can easily think of a dozen from personal knowledge, which in retrospect, just had to happen. The terrifying aspect is that in most cases, at least someone, in some cases the pilot involved, in others an associate or friend, knew enough to be aware there was an underlying problem.

Doug Edwards - a former Air Force fighter pilot, flying instructor, safety officer and aircraft accident investigator - uses the more modern term 'denial', in his must-read book, Fit To Fly. He develops the concept of 'cognitive fitness' - as distinct from the physical fitness which every pilot recognises as important and its essential role in the makeup of a competent and professional pilot. He stresses that the book is not suitable as a reference in classroom learning, but is designed as a private reference to promote introspection and self-development. It works.

It's sad but factual that almost since aeroplanes first flew, there have been people flying them who would better have chosen another career path. Edwards, repeating the often-quoted 70% of air accidents that are attributable to human factors, points out that if that figure stays static while the amount of flying increases at forecast rates, a major air accident will be on the front

pages once a fortnight by 2000. That's when the industry will cease to grow, because air travellers base their decisions on numbers, not on percentage statistics. Edwards, to our mind accurately, predicts that current events are on track to force the aviation industry to become more self-regulatory. He also accurately comments that only then, can flying truly be called a 'profession', because that is the true definition of the word.

So something has to be done. And like all problems, identifying it is the first and major step towards solving it.

It's not a question of purging the industry of people who 'don't fit in', because there's at least a bit of denial in all of us. It is a question of honest self examination. at both industry and personal level. Haven't you, either as a single pilot or as part of a crew, ever done something in the course of your flying that you later wished you hadn't done? That you wouldn't do again? If so, you're half way there, as Edwards emphasises: 'High denial people will make perfectly satisfactory pilots if they have learned to deal with those aspects of their character. Indeed, there are many out there who have done that.' Good thing, too, or we'd have run out of pilots long ago.

Edwards' background in accident investigation, his insight into some significant specific accidents, his grasp of human factors as they affect both single and multipilot crews, and his thought provoking style, make his book a valuable contribution to modern air safety.

Almost any pilot, private or commercial, at any stage of his or her career, will positively benefit from reading *Fit To Fly*. Then, of course, there are those to whom it can't happen.

Review from Australian Aviation July 1997

• FIT TO FLY — Cognitive Training for Pilots, by Doug Edwards

Possibly one of the more interesting books concerning pilot training *Fit to Fly* throws conventional ideas out the window and begs the question of why hasn't someone thought of this before?

With the subtitles of 'Cognitive training for pilots' and 'Practical air safety controlling stress in extreme conditions', *Fit to Fly* looks at stress, fear and denial as causes of accidents and the way pilots respond to these in flight as well as in everyday situations.

The author has a wealth of experience having a background as a former RAAF instructor, safety officer and aircraft accident investigator which adds to the relevance of this book for professional pilots.

One positive aspect of this book is the way in which information is presented. It is extremely easy to read and arguments are not pushed on the reader, rather the reader is free to agree or disagree readily. This actually helps the author with his view sometimes.

The author also pushes the point that aviation should become a profession (no argument there I'm sure). Currently pilots do not fall into this category as they do not control skill standards and qualifications as do other fields such as doctors or engineers. Instead the industry is regulated by a seemingly hated government body and pilots have little say in this matter.

Although the concepts in this book appear abstract, they make a remarkable amount of sense and if one is open minded enough would probably prove extremely useful for pilots and non pilots alike. *Fit to Fly* also includes a number of exercises designed to increase your own 'mental fitness' that could help a person think clearer and faster in times of danger. It is well worth a look.

They're their words, not mine – make up your own mind. (It may be about being open to challenge.)

Red Flag

Practical Risk Management – Overview & General Description

A holistic system, designed to be integrated seamlessly into a Safety Management System, **Red Flag** relies on individual performance. Training – introductory and continuing – is essential. Critical competencies include Error, Stress and Crew Resource Management.

Red Flag's operation within an active Safety Management System (SMS) is vital for effect. The SMS must include measurable provisions for continuous improvement and external supervision.

The individual's **Red Flag** kit includes:

- A Checklist to be used on designated occasions,
- A User Guide, and,
- A detailed self-appraisal reference (Fit to Fly).

As a result of **Red Flag** training, participants can:

- Awaken higher alertness at decision to render the act of choice more certain.
 - Continuously stimulate higher alert states.
- Commit to evidence-based decision if possible; apply calibrated judgement if not.
- Apply innovative Human Factors knowledge to Situation Awareness and decision.
- Operate positive Error Management techniques.
 - Learn from incident and accident reports.
- Integrate fatigue management into Risk Management practice.
- Participate in a Safety Management System; contribute to the safety culture.
- Knowing the critical safety competencies, self-appraise own fitness state.
- Secure a benefit – eg, insurance – by demonstrating lower error potential.
- Exercise to maintain essential decision-making skills in a high state of fitness.
- Integrate Risk Management into lifestyle.
- Study and exercise continuously to improve Risk Management competencies.

*As noted, **Red Flag** is an all-encompassing system whose individual attributes are contained within and supported by a Safety Management System that is continuously monitored and improved.*

Lead Companies act as supervising agencies in their field.