Joint Submission

Senate Inquiry

CASA Administration and Related Matters

Dr Geoff Dell, Mr Doug Edwards

Introduction

This submission seeks to take up the challenge inherent in the Committee's third term of reference and to endeavour to point to "… *ways to strengthen CASA's* …" capacity for regulation, regulatory reform, governance and relations with industry.

Previous inquiries into CASA (and forebears) have, in our experience, attracted plenty of views, many of which were critical of the Regulator's performance. We wish to advance a different line of argument, and not just add to the list of grounds for disquiet with CASA. That is, we have positive suggestions to improve safety performance in the whole system.

Complaints may be valid. Our view, though, is that their origins merely define the boundaries of the normal "human performance envelope". What you get is all you should expect. Results will be both bad and good.

Indeed, CASA has achieved a lot in recent years, in areas such as adapting to the "Internet age", eg, offering services online. The consultation process associated with regulatory reform is also first rate. It has been criticised for slow pace, but, given the mechanisms needed to manage the deployment of statutory power it's hard to see it moving faster. Structurally, you can't see much room for improvement in the normal consultative process. (It's being particularly well-administered helps.)

This paper seeks to suggest means for augmenting the potential of a regulatory system to deliver safety effects. The authors are Dr Geoff Dell, Dean SIA College of Fellows and Mr Doug Edwards, pilot and aviation safety consultant. CVs are attached. They supply ample testimony to our expertise in safety and safety management and evidence of our capacity for innovation and design of flexible, fast track, solutions.

Attached are copies of recent submissions on matters in the Committee's area of interest. The whiff of criticism through these writings is inevitable – the papers are exercises in advocacy. We are hardly going to suggest changes in areas where all is rosy. Conflicts of interest also arise, as we often recommend improvement with a view to assisting, as external consultants, in its design administration.

William Langewiesche, a second-generation writer on aviation (his father's book is evocatively titled, "Stick and Rudder") wrote an article for Atlantic Monthly on the ValuJet DC-9 accident. The aircraft was brought down in the Georgia Everglades by fire in the cargo bay. Chemical oxygen generators ("… a mask will drop from the panel. Pull it down to start the flow …") had not been properly packed. In analysing the Regulator's many failings in "permitting" the accident, Langewiesche wonders if, indeed, it can be done. Can regulators prevent accidents? He thinks not. He's wrong, of course.

Link to article.

However, when better safety is the promised outcome, conflicts hardly matter. The outcomes-based cycle enables precise delineation of absolute rights and wrongs in safety. Results speak for themselves through the objective appraisal discipline. There's greater efficiency and thus cost savings.

The Attachments point to our competence and ability to analyse, design and deliver potent safety measures. As we design on the evidence, our suggestions are always outcomes-based. Their effects can be measured.

In designing improvements to the safety system, we note such phenomena as CASA's failure to adopt, or develop further, such measures as Improved Pilot Training Guidelines (Atch. D). The people whose positions embrace the relevant duties and responsibilities seem impotent, unable to conceive of the next step to be taken (or they're dissimulating).

Recommendation #1

Our first suggestion, therefore, is that stronger individual competence will enable flexible and dynamic innovation. The limiting boundaries can be transcended. The catalyst enabling such gains could be described as "*informed intellectual flexibility whose innovative potential is uninhibited by the demands of daily administration and statutory and organisational needs*".

Highly effective training will be essential if the capabilities of the Government's aviation safety staff are to be improved. However, it can be done, given a specialist unit. (The training principles described in Atch. D will help.)

Further, inherent in an entity able to develop and deliver tightly focussed human development is its capacity to support CASA functions in ways the Authority cannot match. In other words, establishment of such a "school" also creates a reserve of capacity that CASA could call upon at any time (akin to Defence's Reserve Force).

To these ends, we postulate the notion of an *Independent Safety Cell*. The general idea is to assign funding from the CASA budget to such an entity, to be located at a tertiary institution through a competitive process. We submit that this is a worthy topic for Committee review.

The proposal for an R&D and training cell, to develop and propagate safety theory and doctrine, implies that the current system is weak in these areas. It is. From our observation, that deficit's causes include:
- A "closed loop" phenomenon, wherein the status quo *goes stale* by being continually recycled, without innovation or regenerative stimulus.
  - Example 1 is flying instruction, little changed since WWII. (Atch. D again.)
  - Example 2 is the "SMS Project", currently in its second or third circuit.
- Simply getting a goal wrong (especially a safety objective), say, from inadequate or incomplete accident analysis, or by application of poor research methods.
  - Drug and alcohol policy, for example, is for random testing. Safety-critical people should be tested before *each and every* period of work.
- Assigning resources erroneously.
  - The example here is focus on the major airlines because that's where 96% of the passengers are. It's also the *safest* operational zone, for reasons of self-interest and consequent robust self-sufficiency.
  - It's akin to putting most of your police in the safest suburb. The strongest safety-developing tools ought to be deployed at such places as the training schools, ie, at

the gateways to the industry, imbuing the right messages to carry into and through a career.

- Reliance on imported "expertise" (some of which is both stale and wrong) irrelevant to the Australian environment – in the widest sense of the word – and culture.
  o This could be a long list. To take just one example, Prof. Hudson's "cultural evolution" and "bow tie" models are entertaining but nonsensical.
- The slow pace of change – for example in progress on regulatory reform has been noted, as has the fact that the wheels of Government often and properly turn slowly.
  o This is a classic instance where "outside agency" could do better. To take the example of the Safety Management System (SMS) saga, now a decade or so old.
  o The aims for the SMS Project could have been achieved by inviting the industry to do it themselves, and to report outcomes routinely, while pointing to any agency able to supply support and assistance to an operator's SMS initiative. As it is, those aims have not been achieved at all (well, not by regulation).

More instances exemplifying the problem areas are provided in the Attachments. They are limited samples – both in scope and from the "outsider" viewpoint. (You never really know what's going on inside. Ask you neighbours.) However, we believe the examples in the Attachments are more than sufficient to illustrate the need for an independent agency able to use high quality research and state of the art analysis to generate innovative safety solutions and to make them available to the industry in fast track, self-help, D-I-Y packages. We can also point to considerable cost savings in following this sort of strategy.

Recommendation #2

Our second suggestion can be more succinctly outlined: It is for a genuine capacity for review of CASA decisions and actions, short of the statutory tribunals – an Ombudsman. The concept is hardly new. Creating a Complaints Commissioner position was a good move, but in the end, that person is not independent and cannot therefore win the trust of the industry.

This is no criticism of the incumbent. We have a matter in his hands, and have discussed it with him. In those exchanges, we have formed a most favourable impression. He rapidly acquired understanding of the situation and was open with his views (which were welcome as they suggested the outcome we felt was proper). However, progress on the matter has blown out and we have no idea of when it will be resolved.

But that is one case, and a distraction. The simple truth is that a mechanism capable of review decisions is needed and that the well-established Ombudsman model seems to be the best for the industry needs.

Summary

This submission offers two positive suggestions.
- An Independent Safety Cell, along the lines of the Victorian Institute for Occupational Safety and Health (VIOSH) at Ballarat University.
- An Aviation Ombudsman, established along the lines common to this function.

We emphasise that CASA failings are typically within the range of reasonable expectations. That is, they are normal. However, the performance of people performing Regulatory functions could be improved with the right sort of training, thus enhancing the Authority's competence, the quality of its outcomes, and grounds for appreciation and respect.

Attachments

The attachments are samples from a library of safety and training related papers generated in recent years. They are tendered with caution, as in most cases, they contain advocacy, being subject-specific writings with action intent. As such, there is conflict of interest potential. We are, in effect, advertising our ability to engage in remunerated tasks to advance safety. We trust that the papers convey a picture of our capacity to perform analysis, and from its results, evolve cogent coherent safety prescriptions.

Attachment A – Some Issues Paper Questions Answered

In this paper we have written answers to some of the questions posed in the NAPS Issues Paper. As above, the aim is to display our capacity for analysis, research and development and system design (eg, a training unit).

Attachment B – Safety Issues Paper

This paper was developed after discussion with a CASA senior officer. The attached version is slightly edited from that sent to the Authority. It is a second draft. Its predecessor had been discussed, and a further version encouraged during those discussions.

Attachment C – Miller Report Response

An edited version of our response to Mr Miller's report discusses further some of the issues he raised, and broaches new ground on some related matters.

Attachment D – Improved Pilot Training

This is the Final Report from a CASA-sponsored Research Project. The main conclusions are directly relevant to our recommendation to the Committee for a training facility. In this paper we display the eminent capacity to analyse occupational needs – especially those involved in resolving safety problems – and to design training to meet needs. The research concluded that more potent training paradigms can be simply produced (in reference to the research's findings) and deployed. Further, when training functions are rendered more efficient and effective, the overall cost (and stress) of training is reduced.

"***High Effect***" flight training means students experience quicker and easier attainment of competencies and retain them better under stress and for longer through the career. Overall, the training is more economical for all concerned. More important, it produces graduates possessed of more robust and durable safety attributes.

Attachment E

Dr Dell's CV – Contact is: 0418 367 569

Attachment F

Mr Edwards' CV– Contact is: 0421 580 929

Referees

Mr Trevor Jensen, CEO, JetCraft Ltd, Chairman, Aviation Safety Foundation Australasia.

Contact: 0421 028 603

Mr Julian Fraser, Strategic Business Manager, QBE Aviation.

Contact: 0418 349 415

Attachment A

Answers to NAPS *Issues Paper* Questions

1. How might the Australian Government continue to develop improved competition and access to services while maintaining appropriate levels of aviation safety and security?

The safety effect of aviation companies' competitive policies should excite concern. The recent fuel price hike supplies an example, wherein major operators announce cuts in areas other than those directly affected by the price of fuel. Safety provisions often take on the character of redundant parts of the overall mechanism. When there are no accidents, is the cost of prevention too high? Protective measures, set in place so long ago as to have lost prominence in proportion to their importance, might easily slip into a "discard basket".

Safety systems within the major airlines are almost certainly impervious to cost-conscious attenuation. These are robust organisational sub-components with well-established structures, rules, guidelines and practices. Replete with self-regeneration mechanisms, they possess and sustain in good health a life of their own. As such, they are more candidates for "intelligently monitored self-regulation" than direct supervision. Monitoring, as will be enacted through the embryonic "Report Card" (our term) system, would suit for oversight.

CASA has tentatively begun such a system. Reports are to be bi-annual. We believe this worthy initiative should be expanded, to be much more detailed – and quarterly. CASA's capacity to produce guidelines for sophisticated safety indicator reporting may be limited. (The need for rapid response program evolution and roll out will be discussed later.) The *Independent Safety Cell* introduced earlier is envisaged as assuming responsibility for design and developing of the appropriate tools and training in their application.

But that's the majors. Smaller operators such as regionals and freight carriers may find cost burdens in a tightly competitive environment impacting on safety defences. They are not as well placed in terms of their safety defences, from the outset. Further, the current situation must be regarded as one of attenuating safety constraints. We confess to be insufficiently informed, aside from the anecdotes and rumours, to suggest a solution, but see a role for an *ISC* in rapidly evolving means to assist carriers restore their safety health. In short, given the facts, that entity could analyse, conclude and recommend protective measures.

Inter alia, an *ISC* should be the recipient of reports. Several benefits follow, such as removal of operator concern at giving information to the Regulator, and because the Cell as envisaged will rapidly achieve recognition for its integrity and superior analytical capacity.

2. Are there ways in which the approach to Safety Management Systems could be enhanced?

The easiest, least expensive, most effective, means for achieving the objectives intended for a Safety Management System (SMS) is to invite operators to develop their own and to report on it and its effectiveness in outcomes-based terms, as above, quarterly.

An SMS may not be the important safety instrument it is held to be, certainly not if the proof of the pudding is in the eating. The US Flight Safety Foundation recently published an article

by Dan Maurino (former airline pilot, ICAO executive, respected safety researcher and commentator) that notes that 80% of major operators do not have a Safety Management System (SMS). If these things were really good, they'd be widely adopted.

Nonetheless, there is a case for formalised safety systems. However, it does need to recognise the underlying "informal system". In this Submission's Attachment B, paragraph 42, first sub-paragraph, we note the longevity and lack of progress on the Part 119 SMS Project. Maurino's observation – and it applies to the local situation as well – would suggest that the Project is futile, anyway.

Paragraphs 30 to 33 of Attachment C seem to support that view. That is not so. As noted, the SMS "need" is not as strong as might seem to be the case. We don't feel unsafe, so aren't motivated to take on another defence. We all have inherent personal safety systems. (Mum and Dad started it, school did its substantial bit, life experience, and so on.)

So do all aviation organisations. Elements are brought in through equipment and its operating instructions, checklists and the like, as well as the people. In flight operations, from ab initio training onwards, safety is taught and monitored. All operators have check and training systems infused with safety drills and precautions, and so on. In other words, a "formalised" safety system is not necessarily a separate entity. However, it can be a blended one, proving its existence through demonstrated capability.

A peerless SMS example is that applying on Collins Class submarines. It is invisible. There is no Manual. Safety management is simply – and comprehensively – "built in" to all operations and all procedures.

There is no shortage of advice (CASA's excellent original three-booklet set, the US NBAA's comprehensive guide, and so on) on what an SMS should be able to do and how to set one up (even bearing in mind that you are merely building on existing safety foundations).

The safety need for a "system" is directed at optimum effectiveness. To get there, specific attributes need to be measurable (eg, decision-making, vital elements of knowledge, ability to perform under stress) – and routinely measured (preferably in operations, such as the LOSA discipline). Reporting thus supplies the reassurance indicators. Of course, outcomes need to be defined, both in terms of human and system performance. That is easily done.

The Regulator will, however, need to be prepared to receive a great diversity of reports and to be able to interpret them for the safety messages they convey. The need for an *Independent Safety Cell* has been flagged. It could perform the supporting functions implied in the above comments.

Our consortium has experience with many operators and aviation service providers (and non-aviation organisations) on advising in safety system measures, design, implementation, documentation and monitoring. We participated in the last "round" of the Part 119 Project – at the point where CASA had warned that the Regulation was about to be enacted and that operators ought to get their SMS house in order.

When no such thing happened – the Regulation remains mired – all of our SMS clients simply downed tools on that initiative. Once again is demonstrated the natural law – if it's

needed, they'll get it and look after it. Far more significant is the attitude, widespread in the aviation community – that unless it's mandated, you don't have to do it.

The most potent safety attributes are those related to self-reliance and personal commitment. Fostering, within operators of all sizes, the motivation to do their own thing will do more to achieve the safety goals of the SMS Project than another cycle of guidelines and workshops. Pointing to outcomes-based indicators they will report on quarterly is the best way to do that.

3. **Should the governance arrangements for CASA be strengthened to better support the role of the safety regulator?**

One gets an impression – and it is available from our reports in Attachments B and C – that CASA suffers from some form of executive paralysis. As outsiders, we cannot diagnose the origins of the gremlin, but we see its effect in practice – in such experiences as tendering a paper such as Attachment B and receiving no response.

Similarly, research (Report at Attachment E), engaged by CASA, concluded with specific recommendations for actions to alleviate the problems associated with the pilot shortage, and nothing happened.

The Recommendations were briefed to senior CASA officers, and the grave safety concerns stressed. The briefing was most favourably received. However, there has been no response (not even acknowledgement of receipt of the Report).

It must be stressed that the Report outlined concerns that are widely held within the aviation community. They are beginning to feature in incidents and accidents. Further, outcomes-based prescriptions were delivered, that only need to be put into practical effect in training syllabuses to immediately begin to deliver safety benefits. These measures are generic to all forms of human activity, and are proven in other aviation environments. The safety potential is not in question.

We read from this sort of outcome – collectively, our Consortium has experience with it in many field and exchanges with CASA over two decades – a certain want of proficiency in CASA executives.

It may be that people recruited for their safety and aviation knowledge and expertise do not necessarily possess a wide range of high-level management skills. Or, perhaps the type of management needed in a regulator is unique. However, as noted, we are outsiders and not in a position to diagnose.

That the malaise exists is beyond doubt: It's effect can be seen in narrow focus in searching for regulatory solutions (ie, regulate rather than encourage voluntary compliance), wrong-headed results (eg, drug and alcohol testing as random not every duty day) and inordinate time taken to field rules and guidelines.

The *Independent Safety Cell,* as envisaged in this submission, would include in its charter developing the ability to perform occupational analysis of regulatory executive functions and to design a range of training courses to equip people for those roles.

From this perspective, the *ISC* is seen as being able to undertake the research and training tasks characteristic of a tertiary institution. A parallel exists at Ballarat University, in the Victorian Institute for Occupational Health and Safety (VIOSH). It was set up for similar reasons. (VIOSH is just the one we know best and may not be the only such "role model").

4. *How can the Australian Government and industry ensure CASA completes its long-running regulatory reform process as soon as possible, to give clarity to industry and to clear the way for new approaches to meeting the regulatory challenge?*

Inferred in several comments above is our strong belief that innovation is the solution. Examples of alternative pathways to safety effect have been given, such as prompting industry to be more safety reliant by developing motivating methodology.

Recognition of safety performance would be part of the incentive package. Self-interest drivers such as market effects and insurance benefits are far more potent than regulations and compliance checks. With the best performers effectively self-reliant, the Government funded component of the overall safety apparatus can be better focussed.

There is no suggestion that compliance checks should be abandoned or neutered. Advocating innovation means a search for alternatives with greater effect and less cost. Professional organisations use peer review. There may be a case for that – if acceptable mechanisms can be found. The current system, wherein a regulator seeks to maintain oversight competency equivalent, say, to a senior check and training pilot, is absurd.

The proposal is to list the regulations still in the pipeline and to challenge the industry, across the board, to activate self-help methods to satisfy the goals of those rules and to report on what they have done. In return, various levels of recognition would be issued.

It needs to be said that a highly sophisticated management framework, unlike any existing model (in aviation, at any rate), would be essential for the viability of such an initiative.

5. *What changes could be made to improve how Australia's aviation safety agencies work together?*

Attachment C is a response to the report by Mr Miller on this subject. It enlarges on cause factors in areas of dysfunction spotlighted by Mr Miller and notes their origins, largely, in human behaviour, as animated by attitude sets and managerial competence. That is, we do not see structural issues as unduly troubling.

As in earlier comments, training offers solutions to these matters. Reasons for advocating the *Independent Safety Cell* include the importance of such training capacity, tightly focussed on specific needs. Training would cover the whole range of extensive formal courses (such as accident investigator) to workshops, seminars, conferences and so on.

We do not suggest that such training does not now take place. Where it does, we note a need for standards setting, and monitoring and accreditation.

(As an aside, there is a pressing, current, need for accreditation. There are many active and proficient aviation safety officers employed by operators and aviation organisations, whose competencies were acquired through informal training and experience over many years. The

ISC could offer recognition of prior learning packages to enable these people to acquire proper recognition through relevant awards.)

We understand that Mr Miller's report is being analysed within the Department and would be pleased to contribute to that process. Further, while we do not feel strongly about Mr Miller's recommendation for Aviation Commissioners, we do suggest that the ISC concept possesses the potential reliably to support such officers with independent technical expertise.

6. *What are the long-term training needs for the Australian aviation industry? Where will the future pressures lie?*

The Research Report at Attachment D displays our capacity to conduct the necessary analysis fully to answer this question. There are, for example, concerns with generation Y personality factors, such as ability to operate as a team, attention management and responsiveness to particular training strategies.

These and related issues need to be accurately appraised – are they real or not? – and if of concern, sensitive remediation measures will be needed. We trust we have established the competence to conduct such activities.

7. *Are proposals such as a national industry run flying school to train flying instructors worth investigating and, if so, how might such a school operate?*

It is a worthy proposal but unnecessary if other measures are enacted.

The whole of the flying training industry must be held in view before any single component can be examined with a view to checking to see if change is needed. To begin, the fact that there are over 220 flight training schools should be compared to the number of universities (37) and other tertiary institutions – and their student numbers and course demands.

Ideally, there would be a limited number (one or two per state or territory) of schools graduating professional pilots, while others were restricted to meeting recreational pilot needs. Achieving that end through regulation would created problems, of which industry resistance would only be the most noisy.

The situation is already evolving through market forces. That is, only a few schools have taken the plunge and invested in the modern aircraft necessary to convince pilot employers that their graduates possess the right capabilities. This "natural evolution factor" can, however, be assisted by Government.

For example, the Research Report already cited has comprehensive guidelines for more effective training. When aiming to graduate professional pilots, these protocols can really only be satisfied with greater use of simulation and part-task trainers. Furthermore, instructors would need to be trained.

All schools currently "rising above the pack" are capable of meeting such requirements. All the Regulator needs to do is make guidelines available and provide some assistance with initial training in them. The industry should be encouraged to do its bit by emulating other professions with a collegiate organisation able to accredit "specialists" and so on.

Reinvigorating Aviation Safety Functions – 2008 Projects

Background

1. Medicine and aviation safety have much in common: preservation of life especially.

2. The *atrophy factor* is another. Cures lose effect over time. Overuse does it. Take an antibiotic agent. You get results at first. But pathogens have immune systems as well. They adapt, to become resistant. Stronger dosages are called for. That works, at first. But inevitably the bug's defences gain strength, and the remedy's effect is neutered. New drugs are needed, and so on. Some pathogens of recent origin – such as HIV and VRE – are impossible to kill. You can only control them. That's done with antibiotic "cocktails", attacks on several fronts.

3. Aviation safety is like that, too. We've eradicated many accident causes. But others linger on. And they may well be gathering immunity against the standard defences.

4. Road safety experience supports the "attenuation" theory. Established, working, remedies appear to be losing their clout. Over 30 years, the fatal accident rate steadily declined as programs such as speed limit enforcement, seat belts and alcohol testing took effect. Despite increases in car and journey numbers, and average journey length, each year the number of fatalities declined. Scarcely acknowledged, it is a sensational result.

5. The trend may have reversed. Since 2003, a growth factor appears to have established itself. With the lag in publication of analysis results it's premature to judge, but consensus in the safety industry is that an upturn is established, with new factors at work, together with old causes rendered less vulnerable by exposure to antidotes. Road safety experts are pretty sure they know why the change has occurred. (Driver attitudes, largely.)

6. The same fate may lurk for aviation safety. And, as is the case for increases in road accidents, causes can be discovered. In this paper I seek to draw attention to indicators that suggest that the effectiveness of the overall safety system – of which CASA's "safety clout" may be the most important component – may indeed be in decline. The bugs are becoming resistant to the medicines. Tried and tested tools may not be as effective as when first deployed. New – perhaps radical – prescriptions may be needed, probably in combinations.

7. Whether a growth factor is at work in aviation or not, the suspicion is too powerful to ignore. As with any system of defences, routine review and renewal is warranted. It may be the case that it is due for aviation.

Aim

8. The paper will draw attention to some observed issues and trends and suggest means for countering the underlying counter-safety driving forces.

Format

9. This draft of the paper sets out observations and then discusses safety implications. Only brief comments are tendered. Each issue needs deeper research and more detailed planning. The principal recommendation is that an *Independent Safety Cell* be established urgently, initially to deal with the *Pilot Training* crisis. Early in its life it should pay attention to – and report on – strategies for handling other issues.

Considerations

10. Where suggestions are made for dealing with problems noted, it can universally be seen that they are consistent with Government policy seeking maximum efficiency in expenditure of public monies. Strategies are envisaged – such as attracting private funds to supplement the Government investment to – that will deliver more safety-per-dollar.

11. An important pre-condition is that proposals must be self-evidently practicable and capable of delivering the promised safety dividend. Aviation corporations and individuals will then invest more than at present in industry-wide (as opposed to within their own zone of interest) safety measures. Industry investment in "collective safety" is entirely proper as well as being responsive to the Civil Aviation Act's "encourage industry" provision.

Pilot Crisis

12. That there is a crisis with pilot supply is no longer in question. Also axiomatic is that well-established safety defences are being eroded. The evidence is everywhere. Of most concern is that "unsuitable" candidates – that is, they would have been rejected by airline and airline-type operators in years gone by, for supposedly sound reasons – are now entering the professional pilot workforce. They will be there for decades, carrying with them the latent pathogens that past policies requiring higher minimum experience levels were meant to trap and/or eradicate.

13. Also of concern – though the list is longer than just two items – is that the loss of experience factors in GA, and consequent attenuation in applied supervision, is affecting general conduct in the air such as discipline in the take-off and approach and landing phases of flight, on and around non-towered aerodromes.

14. *An Improved Pilot Training (IPT) Project has been recommended to CASA – but there is no response to date.*

15. *The IPT Project proposal is based on CASA-sponsored research carried out in late 2007. That Research[1] produced Guidelines for more efficient and effective pilot training. The prescriptions so defined offer, inter alia, higher safety factors earlier in pilot training/experience (and thus will act to offset the concern at low experience on entry to professional aviation).*

16. *In effect, a syllabus following the Guidelines provides easier learning of flight competencies. When the Guidelines are applied, not only will graduates carry stronger safety attributes, they will have gained more robust piloting qualities and competencies*

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[1]   Research findings are on my website under "Flight Training": http://www.linklearn.com.au/redflag/home.htm

overall – and at lower cost to them (and the system) than in current WWII-type syllabuses.

17. *Further, the IPT training system will use low-cost (~$400 per aircraft) GPS tracking systems as flight recorders, implanting flightpath management discipline from the beginning.*

18. *The prescriptions are <u>catalytic</u> in effect, which means that they are injected into existing syllabuses. That is, there is no change other than in efficiency/effectiveness and thus outcomes. In short, you get more bang per buck. A practical exercise/trial is proposed.*

19. *It needs to be noted that CASA has reacted to the pilot crisis – by recruiting Examiners. This approach may work, but not as quickly, nor in as many flight schools, as the "IPT catalysts". Meanwhile, old pathogens are evolving and new ones developing. They're out there right now and moving into professional pilot positions where they'll live on for decades.[2]*

Risk Management

20. Aircraft crashes are no different in causation from other catastrophes – and the financial sector is presently providing plenty of examples. (Bear Stearns, Opes, Lift Capital, …?) You can be sure that every one of these dazzling models of financial engineering that crashed were fully compliant with a brilliant Risk Management (RM) model based on a national standard. The standard RM prescriptions are clearly flawed.

21. Yet the very same paradigms have been adopted by CASA for aviation RM. That is, AS/NZS 4360:2004 doctrine has penetrated aviation. It was a great error. The Standard is an economic model of intrinsically dubious merit – or perhaps "proven fallibility" is more accurate. It certainly has no place in *high-reliability* operations. That is, its adoption is contrary to the interest of aviation safety. Here's why:

22. *The RM models espoused by the Standard originate in gambling and the gambling industries (eg, securities and commodity trading and insurance). While the theory of large numbers delivers useful paradigms for bet-offsetting by bookies – and for decision-making in businesses characterised by billions of transactions (say, annual fee for insurance policy) and millions of losses or failures (insurance payouts) – their application in a high-reliability activity such as aviation may actually encourage hazardous planning.*

23. *Aviation is characterised by millions of "transactions" (flights) but very few failures. RM the 4360 way is the equivalent of tossing a coin on the understanding that losses are inevitable and therefore tolerable. The risk is "calculated" so it must be diminished. Safety defences are thus weakened. The guard is dropped. It's the adaptation syndrome – "minimisation of the monstrous". (Especially worrisome is a development in which 5 GA fatalities can be designated a "Moderate" consequence, as in CASA's RM model.)*

24. *The problem with the 4360 approach is that the answer is always "Yes".*

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[2] There are too many informal reports via pilot networks to list, on the overall breakdown in standards and discipline (consequent on the disappearance of the most experienced pilots and instructors) now pervading the GA sector.

25. In aviation, "No Go" is often the appropriate response to a contingency plan under consideration. Aviation, as a high reliability industry, needs matching RM doctrine. It will be structurally close to 4360, but will recognise the unique nature of our environment. Primarily, it should focus on risk-activation – ie, decision. A descriptive term, better than RM, is Hazard Management. (This view has been promoted within aviation by one of the safety industry's leading[3] advocates.)

Safety Doctrine

26. Any safety system needs a comprehensive expression of doctrine specific to its operations. As well as the above, many issues could be discussed under this heading[4], such as decision-making (and the links to RM and Hazard Management). However, the overall tip-of-the-iceberg item that needs examination is the upper-level policy guidance generally known as *outcomes-based* (OB).

27. That is, the initial focus should be at the strategic level, and how to "operationalise" this cardinal principle. An enabling necessity, of course, is that high level staff such as CASA's leadership group be thoroughly conversant with such vital doctrine.

28. They appear not to be. To continue with the example, OB provisions (for regulations, safety plans, advisory material, etc) remain an ideal that, while clearly spelled out as a policy driver, fails to translate into effective rule making and safety management. Key operational staff seem not to grasp its import. They certainly don't act as if they do.

29. Recent editions of ***Flight Safety Australia*** (FSA – to take from just one source) contain plenty of evidence that CASA executives do not understand the meaning of OB policy. FSA series stories about "what went wrong" on a flight illustrate the problem. These generally exciting yarns invariably lack a "*safety sting in the tail*" – practical prescriptions for preventive actions. There's plenty of non-specific, intangible, waffle commentary, such as "pilots should be aware … take care … etc". This sort of stuff does not accord to the OB principle. To get there you need to define the specific competencies involved , how to train for them, and how to measure their "Fitness" levels.

30. It may unfair to cite only FSA for the observation. The same thing bedevils progress on other regulatory projects and safety initiatives, such as surveillance plans and safety promotion ventures[5]. The Safety Management System project, now in its tenth year, is a classic example of a quest for the right rules rather than clear directions as to outcomes required.

31. Pure Safety can be clearly defined, in both theory and practical terms. So too can outcomes-based prescriptions be enunciated as concrete benchmarks, plans and actions and the means through which to measure the "health" of clearly defined safety factors. To return to the FSA example, no incident narrative should be published without advice as to what, specifically, a pilot, instructor or flight school should do to deal with the

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[3]   Dr Geoff Dell, President, Safety Institute of Australia. See: http://www.protosafe.com.au/Our People.htm

[4]   Other "Safety Doctrine" issues include: Gen Y (and the related concern with training in the schools to detect and "train over" Gen Y pathogens), the saga of Part 119 (SMS) and alternative outcomes-based strategies for achieving SMS policy objectives, the state of the consultation process (and need to revitalise it [and inject an appropriate measure of discipline]), voluntary safety reporting paradigms, and so on.

[5]   CASA's "Decision-Making" CD is not only an egregious example of failure to meet OB standards it actually *promotes unsafe practice*. Thus illustrated is the need for quality control over doctrine development.

problem and how to routinely train for and measure effectiveness of the preventive actions. Safety promotion material must specify identifiable results and advice on how to check attainment of OB objectives.

32. The need here is for training materials (specific examples) and programs for designated staff, starting with the leadership.

Specific Safety Alert

33. *Above cited is the influence of the "adaptation" bug – repeated statements of concern over a "problem" attenuates the sense of alarm. An example is the "pilot crisis". We all saw it coming. Warnings were sent out, 5 and more years back. They were repeated, often. Now we're all just 'boys who cried, "Wolf"', ignored, indeed, scorned. What started as a call for urgent, targetted, action has degenerated into the same routine processing grind that characterises regulation-development.*

34. A Project to deal with the pilot shortage and its consequences is urgently needed. Get this right and CASA's repute stands to be markedly enhanced. At least one such Project has been recommended to CASA without response. (It is described elsewhere.)

ATSB Reports

35. We recently alerted CASA to concerns[6] with an ATSB publication on Pilot Spatial Disorientation. It richly warrants anxiety – and rebuttal in some instances. (It's serious. Where the author got it wrong, training based on his version may be counter-safety.) From one perspective – safety coordination – one wonders that the ATSB did not refer the booklet to CASA before publication. From another, CASA has not responded to the alert. Systemic deficiencies in both organisations are thus highlighted.

36. On 11 Mar ATSB released: ***"Analysis, Causality and Proof in Safety Investigations".*** It ought to be of concern to CASA as, in part, it cites the Lockhart River accident and the Queensland Coroner's robust criticism of CASA's submission to his inquiry. The "Analysis" juxtaposes that criticism against the Coroner's praise for ATSB and their analytic paradigms. (And they are good, though far from perfect. Time taken to get out Interim Reports can be excessive, and too often conclusions are limited in ambit.)

37. *In terms of preceding (albeit scant) argument on Pure Safety and OB frameworks, the CASA position was proper and sustainable. It may be the case that no real damage was done to CASA by the Coroner's critique, and that its repetition by ATSB in their booklet has no follow on effect. Nonetheless, in Pure Safety terms the overall aim of fewer accidents is achieved by getting these matters right, demonstrably so, and not by trenchantly defending an esoteric and purist doctrine of accident investigation that poorly translates into outcomes-based prescriptions. (And it seems to be another case where the publication – out of courtesy alone – should have been referred to CASA first. [As I'm told it was not.])*

38. At a minimum, ATSB and CASA need to coordinate such publications. Collegiate agreement on safety principles, objectives, and means of attainment shouldn't be too hard, either.

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[6] The report tendered was a draft. A final version is in production.

"Pure Safety"

39. As if to supply evidence for this paper, the SCC Discussion Forum recently sprang to life (it's generally moribund). First, there was a testy debate on pilot maintenance and related safety factors. Next came more of the same regarding CTAF radio calls. There was a lot of assertion and no science (though several calls for appropriate risk assessments were based on good data). Nevertheless, the debate offered an opportunity for an authoritative input from CASA. There was none. Instead the thing was allowed to fester – until it died out through natural "passion attrition" – perhaps to be placed simmering on an agenda for future debate. In the end, few participants were satisfied.

40. *Arguably, very few such issues are not amenable to analysis and conclusive resolution in terms of "Pure Safety". That is, the issues can be teased out and discussed with recourse to facts, science and clear logic, so that conclusions drawn, such as the need for this or that regulatory provision (provision, not regulation, there are many more options available than are typically chosen) stand acceptable to all. Failure to even seek such an outcome diminishes the stature and authority of the Regulator.*

41. The pressing need for doctrinal development and staff training is thus reinforced.

Other Matters

42. Below listed are brief comments on other concerns that might best be tackled through *Independent Safety Cell* review and resolution.

- Part 119 Project – Safety Management Systems (SMS). This Project has been underway for a decade with little sign of conclusion. Safety goals can be more rapidly achieved. A campaign for voluntary adoption of SMS would get results way ahead of the legislative line of advance.

- Personal safety systems. In concert with securing voluntary adoption of SMS, *personal SMS* should be invoked. Standards, depending on the working environment, are readily defined, formalised and adopted. In a parallel with Medicine, aviation professionals need the equivalent of medicine's Hippocratic Code. A parallel need is for the associated continuing professional development (CPD) programs. Keeping track of CPD activities and currency (personal fitness) via a website activates the Internet's potential to be a real-time safety support system. It also supports the overall ethos of voluntarism.

- Get more back from Industry. A wide range of expertise is to hand, unexploited. The associated knowledge, science, equipment and ideas could be tapped. Exploiting such sources fits in with the idea of crafting of personal and corporate codes that are truly outcomes-based. Access to industry state-of-the-art expertise promises shorter response times and greater flexibility and capacity than, say, CASA recruitment. (Again, better "bang-for-the-buck" is achieved.)

- Voluntary incident reporting. With the best will in the world, current means for discovering what's going wrong out there hardly scratch the surface. A system is needed that is likely to be trusted (more than anything operated by a Government agency). That current systems fail to capture the incident data that is essential to effective accident prevention programs is well known. So too, is the fact that there is

little that can be done to make such mechanisms more safety-effective. On the other hand, the NASA ASRS program highlights the potential for an independent reporting network.

2nd Draft Conclusion

43. As noted, this is just a sample set of undeveloped snapshots of what one observer thinks are current safety issues. Overall, it strongly supports the *Independent Safety Cell* approach. That is, create something that'd swiftly come to grips with problems and sort them out according to priority without becoming bogged down by bureaucratic tarbabies. Indeed, isn't that what aviation is all about – moving ahead at speed, flexibly adapting to challenges, be they technical or environmental, considering all options (potential diversions?) as the flight progresses safely to destination.

Attachment C

Excerpt from Submission on the Miller Report

Introduction

1. The Miller Report is a good read, mercifully short on verbiage and marked by convincing analysis and sound common sense. That said I suspect that your average aviation type will find it tiresomely legalistic (and thus won't be read thoroughly or with full comprehension). More to the point, one can regard the Report with great respect but remain hard pressed to find a direct link to consequential improvement in safety-of-flight in Australia.

2. That may not have been an objective. Nonetheless, if pieces of the aviation safety mechanism are to be tinkered with, then:
    *   The changes should not diminish the effect of any existing safety defence; and,
    *   More importantly, the ability of the forces unleashed by re-organisation to improve safety should be intelligently and aggressively exploited for maximum clout.

3. That is, if micro level repairs are needed, then fixes should be designed with overall system performance in mind and a view to synergistic enhancement. The argument for enlargement of the scope of reaction to Miller is augmented if there is reason to believe there are untreated threats not yet caught by the CASA/ATSB net. It is no criticism of Mr Miller to suggest there are. His radar wasn't set up for lurking hazards.

4. Implementing his recommendations in concert with other safety-improving projects is going to produce more protective effect than otherwise – and at the same time offer substantial economies in safety management.

5. Supporting the case for broader consideration before acting is that many of the problems Mr Miller notes, and that his recommendations set out to resolve, are behavioural in origin. Re-jigging the machinery is no guarantee of a fix. On the other hand, the "unseen hazards" are real and pressing. The Miller Report can be the catalyst for improvement in safety factors.

Qualification

6. A limitation on writing commentary from outside a system is that lack of visibility does not necessarily establish ignorance or inaction. That is, I might see a crisis screaming for action and the problem may be securely in hand. (I doubt it, but it is possible.)

Current Threats

7. With that caveat in mind, there seem to be at least three untreated hazards of recent origin, one of which is grave and immediate. Its source is the explosion in aviation activity and consequent accelerated professional promotion of individuals.[7] Again, a "Miller +" strategy could deal with the threats in concert with action on the Report's recommendations.

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[7] The problem is acknowledged throughout aviation. No defences are yet deployed, though rapid and effective response is feasible. (And yes, I have presented CASA with a submission on such a scheme.)

8. Though the phenomenon is not confined to pilots, their situation is of most concern. A safety deficit thus inserted into passenger carrying operations could trigger the worst consequences. It is a complex issue, but the nub of the problem is that in the past a pilot had to accumulate high levels of experience before being considered for airline (type) operations. The practice – experience to compensate for training shortcomings – is *explicit recognition of a defective training system*. There is presently no suggestion that training has suddenly improved. But entry-level experience has plummeted. Ergo, the national passenger carrying system is less safe. The proposition may be arguable[8], but any such risk, uncontained, is untenable.

9. Other lurking hazards relate to Gen Y characteristics[9], and asserted, worrying, attributes such as attitude (and ethics) sets and attention-span management. While not as scary as the first gremlin, they are cause for disquiet. Their investigation and resolution are squarely within the charter of CASA and the ATSB.[10] If they are a problem, and it is not dealt with, then career-long hazard factors will enter the aviation workforce.

10. *As an aside, this issue engages Mr Miller's recommendations for better CASA-ATSB-Industry cooperation. There is an implied threat at large; it needs to be investigated. (Is it a problem?) An opportunity thus arises for a CASA-ATSB-Industry Task Force to determine whether any of the asserted problems truly exists and, if so, to swiftly design remedial measures.*

11. This proposal is opportunistic in many useful ways, not the least being to remind selected staff of the value of (and, who knows, pleasure from) cooperative work between agencies with important social responsibilities; to rehearse good practice and develop procedures for more; and, to come to grips with issues that may have significant safety implications. The scheme is in harmony with the spirit of the Miller Report and can be started right away.

12. But I digress. Apologies. To return to the point of departure, some of the problems reported by Mr Miller are, as we say nowadays, anthropogenic. I will argue that they are type of systemic deficiency that originates in organisational culture – and thus won't necessarily be remedied by re-organisation. The defects are damaging to the National aviation safety effort and should be dealt with. In short, neither agency is performing to as well as it ought. Know why and you can design remedies. Accurate diagnosis is essential for that.

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8   Competency-based training (CBT) was meant to be the solution to the "experience problem". The Air Force places 200-hour pilots in major operational aircraft cockpits. However, the civilian system has not come to grips with CBT needs and realities, and civilian pilot graduation standards, nationwide, remain woeful. Pilot employers, naturally, sought maximum experience to compensate. Not any more.

9   The list of safety concerns is quite long – and it must be stressed they are potential, not proven hazards – and includes the effects of experience with adventure exercises (extreme roller coaster rides, bungee jumping, etc), mega-death computer games, virtual reality simulations and so on.

10 The Gen Y attributes and their safety implications are the stuff of speculation. However, they are susceptible to empirical review in terms both of existence and operational effects.

Aviation Culture[11]

13. That is, the existing CASA and ATSB cultures ought to be borne in mind when reviewing the Miller Report, especially if contemplating the changes he suggests. As noted, reorganisation may not deliver behaviour modification. There's no point in upgrading computer hardware if the cantankerous old software remains in the driver's seat.

14. CASA and the ATSB are creatures of – inter alia, they recruit staff from – the aviation industry. To a large extent its ambient values and attitudes are absorbed. That is not to say attributes are embedded in total and as replicas. But plenty of sibling attributes are to be observed (eg, hair trigger ego defence). However, as well as "transfer via hiring", aviation's prevailing forces buffet the agencies. Certain unique cultural features are thereby induced; defensiveness prominently, the inevitable consequence of being shouted at too often (and undeservedly, they think, and generally rightly).

15. Australia's Aviation culture reflects a unique environment – remote areas, sheer *size* of the operating zone – and so on. Perhaps as unique are the highly emotional undercurrents and irascible forces that are part of the overall package. It is one touchy organism.

16. "Plane Safe" (Morris) gives compelling insights. Indeed, it may well have set a record for a Parliamentary report in recourse to "v" words – *vehemence, vitriol, venom*, etc. Committee members report being shocked and dismayed by the intensity they encountered in evidence giving. Alert observers resolved never again to let this genie out of its bottle, and there it's stayed all these years, a mighty reserve of pent-up emotion, ready to blow. This reality needs to be borne in mind vis a vis the Miller Report. For example, a seemingly innocuous proposal for the ATSB to *share information with CASA* may provoke disproportionate response. If there's no paroxysm then the chances are it's just been overlooked.

17. Defensiveness is understandable. Constant harping saps morale, and erodes performance. But like the nearby noisy road, such irritants lose their sting with constant exposure. But a balm works, too. Another cultural attribute so acts, to offset the sensitivity-to-criticism factor. It is evident in both agencies, bolstering individual and collective self-esteem – the complacent certainty they're doing a terrific job. (Examples are given, and show how it too degrades performance.) In the end, neither is as good as it thinks.

Cultural Complacency

18. In common with most observers, Mr Miller praises both agencies: World best practice sort of thing. It is probably just being polite – but a tad overblown nonetheless. For starters, safety outcomes are not solely attributable to executive fiat. Mum, Dad and school get in first. Later, self-interest is a keen influence, reinforced by life experience (trial and error, mainly).

19. To the extent these innate informal factors are at work, performance of a statutory safety system is less impressive than (even learned) observation might suggest. Indeed, when a calibrated measure[12] is taken of prevailing characteristics in evolved human defences, the

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[11] The outsider viewpoint is again deployed.

[12] For calibrated measure read objective survey of validated outcomes.

contribution of *the safety system* is all that remarkable – a conclusion supported by such things as a track record of error[13] and torpidity in the face of newly obvious threats.

20. Perhaps more important, containing contemporary safety challenges – neutralising previously unknown threats – locates regulators in the bailiwick of the *"Law of Diminishing Returns"*. They're definitely operating in the margin, and the easy problems were solved generations ago. Unprecedented levels of energy and innovative vision are called for. That aside, all forms of development start from the present reality.

Better Safety

21. Safety is the product of individual activity, typically through decision-making. As noted, the foundations for defences against mishap were mainly laid during childhood, with family, schooling and personal experience the main contributors.

22. Furthermore, statutory bodies operate in the territory between human capability and the external demands of life. Aviation opens a broad zone, here, and it is, in the main, well served. And, as noted, the regulators can take credit for few existing safety attributes not more than, say 10 years old.

23. More important, they are seeking to influence people within whom a strong foundation of safety capacity already exists. It might come across as complacency, but really, it's just a sense of security, confidence in inherent defences, don't feel unsafe, and so on.

24. Failure to note this reality inhibits further advances in safety – you underestimate the degree of difficulty involved in gaining traction, eg, training for behaviour change, a formidable challenge originating in the grim pedagogic truths about adult learning.

25. There is thus a need for exceptional human attainment in besting these adversaries. One wonders if the current line up of functionaries is up to the contest.

26. Just as the troops impressively arrayed in Guard of Honour formation for a visiting dignitary are no sure indication of the warfighting efficiency of your Armed Forces, a glowing report from an ICAO audit does not give a wholly accurate picture of the professional fitness of the personnel manning aviation's safety defences. Audits are poor indicators of competence. Backward looking, they tend to report on mechanisms and compliance with organisational arrangements. Great structures do not necessarily generate outstanding results. As before, only objective evidence of actual achievement establishes real failure and success.

Performance

27. I'll use a few observations later to show that, from an outcomes perspective[14], neither CASA nor the ATSB score well. Again, this has limited relevance to the Miller Report. Its focus was the inter-agency relationship. However, the animosity that characterised relations was, in part, a by-product of performance. They don't respect each other's products, and have long been taking potshots at each other over professional standards.

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[13] Only a few examples will be tendered. Plenty more will be supplied on request.

[14] "Seen" from without. More examples are in the attachments.

28. To start with CASA staff; they get annoyed by what they see as an ATSB inclination towards self-promotion.[15] Press Conferences! It's a minor quibble, and if an irritant, not a serious one.

29. More significant, CASA are moved to anger at (what they see as) ATSB's failure to publish comprehensive analysis and conclusions in reports. That is, not all accident issues are canvassed or judged. They are on stronger grounds here[16]. The CASA troops see "under-reporting" as making their job harder. The ATSB folk don't think they need to help CASA.

30. In turn, ATSB investigators often find fault with CASA safety oversight, and get to say so in reports. This all turns up in the public domain. A sense of righteous indignation arises over overt and implied criticisms. They are seen as unrealistic, redolent of a "perfect world" in which no motorist ever exceeds the speed limit. How can the CASA "cops" watch over every shoulder, and so on.

31. Readers chuckling over the suffering underlying these mutual slugfests might wish to re-read the preceding section on "culturally-induced sensitivity". More to the point, the Miller Report is about the relationship; it has been poor and needs to be improved. But performance in both agencies has been poor as well, and deserves to be enhanced. As before, the overhaul should be a complete project, not done piecemeal.

32. Reflection on some indicators of low standards of attainment (outcomes) supports the case.

CASA Culture and Performance

33. One instance (you can pick from quite a field[17]) of CASA under-performance is the Safety Management System (SMS) project (Part 119). The basic guidelines were first published over ten years ago, and they're great. First rate. Could hardly be improved.

34. These plain outlines of design principles are set out in straightforward, well-expressed, comprehensive, guidelines … that have achieved nothing. A decade later, the project grinds on, demonstrating yet again that an intricate structure for regulation, admirable in its own right, and scoring top marks in audit, can perform woefully in practice. The proof of the pudding is in the eating. And the reality is that very few operators have a "living", effective, SMS.[18]

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[15] On 11 March the ATSB released a "discussion draft" (it looks mighty like a final version) of: "Analysis, Causality and Proof in Safety Investigations". It's boastful, inter alia proudly quoting Coroner Barnes' forthright criticism of CASA's – and praise for ATSB's – evidence to his Lockhart River inquiry. On the basis of facts and logic alone (forget ICAO no-fault doctrine for a moment), the CASA submission is sustainable. From a safety practitioner (and one quite familiar with the North Queensland aviation culture) viewpoint, the CASA line had plenty going for it in terms of developing prevention measures. But that is subjective. Either way, for *balance*, ATSB's report (Analysis, Causality, etc) should have included more than just a single example of Coronial commentary; eg, SA Coroner in Whyalla Airlines, WA Coroner Hope on the King Air hypoxia event, another Qld Coroner regarding the Capricorn Helicopter, Marlborough, and so on.

[16] The attached "SIA" paper gives two more instances. For balance, it also contains examples from other fields.

[17] I have attached a paper I just sent CASA listing areas for safety attention. It is "Draft 2". The earlier version received no response. Better pilot training was and is at the top. It's too early for a response, yet, to the latest Draft, but I'm not holding my breath.

[18] A simple solution is available: encourage voluntary adoption of SMS. CASA seems to prefer the slower mandating route. Another example is improving pilot training; the problem has been recognised for over 10 years. To give CASA their due, a project to lift training standards is underway. We shall see.

35. An outsider's perspective on an organisation is a poor basis for analysis – and especially criticism. I'll therefore just focus on a few aspects of CASA's modus operandi that I feel are prominent. The main issue is what you might call "management maturity". The conduct of administration is poor. It may be the case that senior officers have been selected on the basis of aviation expertise, and perhaps some grounding in safety doctrine. Whatever, there is little evidence of formal management training in their conduct. Design and operation of *systems* – even such basics as corporate structure (eg, who reports to whom) communication, meeting conduct, correspondence courtesies, consultation – and especially innovation – are startlingly rudimentary and ineffective.

36. Perhaps more important is decidedly average response to safety deficit notifications. Senior officers handed clear evidence of existing or evolving hazards act like deer in the headlights – unable to conceive of the next move, paralysed. Even when led through arguments and likely solutions[19] – nothing happens. Or perhaps there'll be another round of appointing a committee (or some such, there are many such working bodies waxing and waning) for yet more long drawn out exercise in consultation.

37. Perversely, these dysfunctional activities operate within an organisation that declares itself to be committed to outcomes-based processes. It also says it is bent on non-prescriptive rules. Yet when something eventually moves it tends to be chapter-and-verse detail on things to do – wholly and narrowly prescriptive – with reasons for doing the things lost in the verbiage.[20]

38. It all bespeaks mediocrity amongst the top levels of management. "Steering messages" – policy edicts – are sent out but there's no corresponding change in corporate direction. Results include important safety initiatives stalled – sometimes going round in circles is mistaken for progress – for want of leadership and a lot of wasted time and effort from industry participants in processes that turn out to have been nugatory. It also suggests that the investment going into these activities is realising poor dividends, and that leads to the conclusion that better management would achieve greater benefits from less capital – more safety bang for the buck.

39. In effect, poor leadership and management means that safety does not advance. Perhaps less serious is that when senior staff don't make decisions, junior staff do. And they can get it wrong in spades (or pursue personal agendas and the like). I have specific instances in mind, but they are too sensitive to publish here. I will make them known to proper enquiry.

ATSB Performance

40. In the ATSB's case, the problem may be the opposite, in one respect – the training may be too good. But first, to an overall measure of performance: The best success indicator is evidence of ATSB reports stimulating safety development, especially via training. The

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[19] These are inputs from an expert whose work is always supervised by another leader in general and aviation safety (the current President of the Safety Institute of Australia). These contributions have attracted respect and acknowledgement of their inherent capacity to improve safety factors.

[20] It's a classic case of what Dixon, in "On the Psychology of Military Incompetence" (not just a catchy title, but a compelling set of insights into human performance and error), calls "the ability to tolerate ambiguity". More seriously, that same human factor attribute is recognised as a major contributing cause to accidents. It is a chilling experience to find it alive and well in a safety organisation.

obvious place to look is the flight schools but I doubt you'll turn much up. There is little or no sign of ATSB report findings being integrated into training, even as case studies.

41. The reason here is partly lack of interest (the industry culture). But the ATSB's reputation is not good and that contributes. To a large extent, it is unfair (again, the culture). However, ATSB reports would win greater respect if they contained more comprehensive coverage and fuller discussion of issues and less carefully hedged expression. The attached paper has two aviation examples of missing issues. (For balance, I have inserted similar experiences from other fields.) This characteristic of ATSB reports is so uniform one can only attribute it to induction training – and maybe that's just too "good".

42. As Mr Miller says, reports ought to canvass all possibilities. Some lines of thought might go nowhere, but the "journey" is usually instructive. As I show in these case studies, important – critical, even – safety messages have not been uncovered and so specific pathogens remain at large without countermeasure. They certainly have not made it into the training system. There are plenty of other instances of serious omission. Again, safety does not advance.

43. In the previous section I juxtaposed comments – qualified as the outsider viewpoint – on CASA organisational shortcomings, highlighting management deficiencies. The ATSB, on the other hand, seems to function smoothly and well as an administrative organism. CASA's problems appear to be attributable, in part, to lack of internal staff development and training. The ATSB seems to have a very strong capacity in these areas.

44. As noted, that may be a negative. The attached "SIA" paper points to instances where the ATSB has failed to even discuss aspects of an accident that might have shed light on cause factors – and extant hazard factors. One senses extreme care being taken to avoid being seen to be critical of an individual. Perhaps. So maybe the sleuths hold back on even discussing an issue – as they've been taught to do?

45. Decision-making on the part of a pilot seems to be one major casualty of this doctrinal prissiness. It rarely gets closely analysed. Some years ago I suggested that the ATSB look into decision-making factors in general. In return I got an insulting and defamatory email. It obviously was sent by mistake (decision-making error?).

46. Nonetheless, the top executives in the ATSB were cc addressees, and not one saw fit to apologise. I stepped back. The decision-making investigation never happened. Insofar as this cultural benchmark is both long-standing and uniformly influential, you have to assume it is feature of a thorough indoctrination process.

Conclusions

47. Mr Miller has rendered a service in pinpointing systemic deficiencies that have contributed to poor relations between CASA and the ATSB. There are other causes at work, however. Key staff members in each agency feel disgruntled with the other for what they see as failings in their performance. To a certain extent, each is right. (From another point of view the critical views are indulgent and wrong.) Neither organisation is scoring top marks. The principal shortcomings evident thus represent the tip of an iceberg the whole of which is detrimental to aviation safety in Australia, and especially inadequate to cope with new pathogens implanting future hazards whose grim harvest may be decades off.

48. No particular forensic brilliance is needed to spot the gremlins working their way into the system. But there's no action so far. If Mr Miller's recommendation for some sort of Board of Commissioners is to be enacted, then perhaps those wise folk should be equipped with early warning hazard detector mechanisms so they can intelligently (ie, being fully informed) oversee the work of both agencies and act to ensure that all gaps in the defences are plugged. There are too many left open at present.

Attachment D

Improving Pilot Training Project

Final Report

This is a report on a Project to identify flight training catalysts capable of delivering stronger and more durable safety outcomes – *"High Effect" instruction*. The quest succeeded. More powerful training effect is feasible – and easy for trainers to adopt, should they wish. When *"HE"* is activated, student progress along the training continuum is smoother and less demanding. It also gets the diligent to greater heights. Graduates will gain superior aptitude in critical competencies. The overall aviation safety system stands to benefit – measurably – and investors receive better yields. A first-draft set of guidelines for HE training has been produced. It remains to apply them to refinement of concepts for practical application, fitness testing for the human attributes involved and design and trial of HE training routines. Project products are ready to serve as the resource foundation for the next stage of development. They include benchmarks for empirical appraisal of essential Human Factors attributes. The potential benefits from Project transition to practical trial, in safety and operational terms, renders further action imperative.

This Report does not provide detail of practical outcomes such as aspects of pedagogy relied on in developing guidelines for training, assessment and the like. These matters are set out on the website, so as to be accessible to all. Brief insights into the theoretical basis for features such as training design are in a "Core Concepts" document. A copy is attached to the pdf version of this Report. A website map and links are provided on page 51 of Core Concepts.

Doug Edwards, Dec 2007
dougwds@bigpond.net.au

Preamble

The brevity of this report is rendered possible by:

- A large amount of material posted on a website (as reference material for training);
- An Interim Report (attached) containing key conclusions, and,
- An oral briefing to senior CASA officers.

After a narrative, Project outcomes are listed. Full reports on each are on the website. Finally, recommendations are tendered. They include additional stages to the Project.

As noted in the Interim Report, the intention to conduct research was frustrated by a lack of resources. From one perspective, published sources are rare – Google search on *"innovation in flight training"* produces only two direct hits: a paper published in 1990 (USN support to Indonesian pilot courses) and another from 1970 (a Rand conference). Everything after those two links is some form of advertising.

The briefing will cover other problems with the research plan. In the event, the Project – as recommended to and agreed by CASA – segued into a "training enhancement project". And, following the Interim Report's acceptance, this summary was published on the website:

Synopsis - High Effect Training Project

The Civil Aviation Safety Authority (CASA) has lent support to a Research Project to develop Guidelines for "High Effect" flight training. Guidelines are published on this website – to be downloaded at no cost. They apply to flight instructors, and current or intending trainees.

Trainee Pilots

For the student pilot, the focus is on preparation (including self-awareness – am I suited to this?) and reasonable expectations of a proper and effective training regime. Practical assistance is given in your choice of a school to train with, at: Selecting the Flight School.

Instructors

While the High Effect Guidelines focus on training design and delivery – and objective measurement of outcomes, they are primarily intended for flight instructors. An instructor, to be capable of using the Guidelines to full effect, will need specific training.

Instructor Training

A single flight school will assume responsibility for developing the Guidelines from the materials produced during the Project. That "Lead School" will also have the role of delivering instructor training courses, to qualify instructors to operate High Effect Guidelines.

Background

In supporting the Project, CASA accepted the argument that more effective flight instruction will graduate pilots with stronger overall competencies – and hence improved safety attributes.

Sources

Early research found little publicly accessible evidence of innovation in flight training. Accordingly, the Project focus switched to original sources – Thorndike, especially – the "heritage" concepts and theorems, and how to transform them for greater potency and higher effect in delivery.

Project Objective

The revised Project aim is to produce reference materials for instructor competency augmentation. The Lead School will train its own and other Schools' instructors in High Effect concepts and methods. Arrangements will be invoked for quality assurance.

Narrative

The general desirability of more efficient and effective flight training aside, the principal prompts for a Project aiming to lay the foundations for better pilot training were (and are):

- The current shortage of pilots ready to assume passenger-carrying duties, and,
- Concerns over certain Gen Y characteristics induced by, for example, habituation to learning (and performing) tasks while listening to music.

Prima facie, these and related influences possess the potential to reduce current and future safety factors. Aviation accident experience – especially in the RPT sectors – does not lend itself to actuarial analysis delivering firm conclusions on risk-factors-metamorphosing-into-adverse-events. Nonetheless, the least-risk strategy dictates prevention before hard evidence is to hand. In safety, *on the balance of probabilities* outranks *beyond reasonable doubt*.

Personal characteristics are manifest in each zone of concern. There is not so much a "pilot drought" as too few deemed suitable for airline service. Any unwelcome Gen Y attributes would similarly be definable in terms of human performance. Training possesses antidote potential – both short- and long-term. The degree of precision achieved in design of problem-focussed training solutions varies, of course, with the intimacy of problem definition.

From that perspective, evidence is scant. GA is the "ground floor" of the industry and would seem to be the first place to look for a safety change. CASA's 05-06 Report shows a steady fall in the accident rate. Statistics also show fewer (roughly 1/3rd) accidents in training vs GA. An adverse trend may not show until some years after "carriers" have left the training scene.
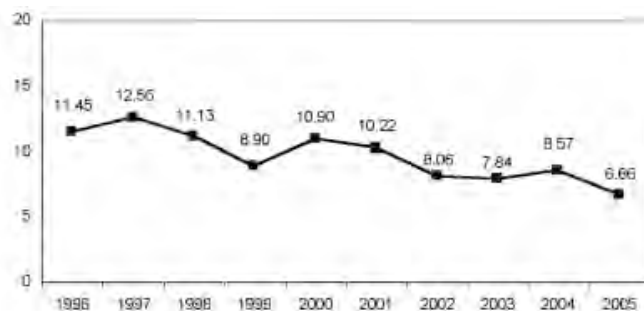
Historically, the accident experience has been the main indicator of safety performance and trends. A consequent criticism is that less serious events – slips, lapses, errors, etc – are not reported – and so latent accident causes evade identification and containment campaigns. In RPT, recorded data (FOQA), especially when integrated with observed performance (LOSA), is delivering a clearer overall picture. *And that picture is startling: the prevalence of threats and errors per flight, and the rate at which they are either not detected or mismanaged, are all much higher than at least one experienced safety professional expected.*

There is no equivalent in the training or GA sectors to in-flight data tracking. Arguably, the origins of future accidents are to be found in these breeding grounds. From there, error causes – potential accident causes – migrate into the pilot workforce. Tacit acknowledgement of this problem has always existed: Pilot employers (and aircraft insurers) require minimum hours levels. Fresh pilot training graduates are not regarded as fully ready for professional service. (Military pilots enter operational service upon graduation.)

Of many flaws in the "hours barriers" policy, one is especially relevant to this Project – the safety factor – strategies for reducing the error rate. "N" hours may suggest that a person has harvested the safety and operational benefits of "maturing as a pilot" – but it is by no means certain. Doubt is resolved by taking the "safe option", experience, even though that is vastly inferior to empirical checks/tests based on good science. And, as FOQA/LOSA show, serious Human Factors "bugs" are evading the traps supposedly erected by experience provisions.

The term "bug" is a version of James Reason's "pathogens". To take Reason's pathology analogy further, the medical treatment cycle starts with identification of the root cause of an infection. Pathogen identified, it is tested for sensitivity; the most effective "killer" is sought.

Bacteria and viruses mutate as they multiply, to develop defences against medication they've been exposed to. But the nature of the mutation varies depending on the environment. Some bugs become resistant to antibiotic A (and remain vulnerable to B), while others can shrug off B (and fall victim to A). "Smart weapon" remedies are precision-targetted, more effective in small doses, lethal to specific "versions" of the bug, and, leaving no survivors, don't promote evolution of antibiotic-resistance and make the hazard worse.

You can see parallels with aviation. Our bugs are shown up by accidents. Analysis is applied to identify the nature of causes and define preventive measures. However, the picture is not complete. As noted, review of flight parameters (FOQA/LOSA) is confined to RPT. There's no objective equivalent in the training, charter or GA sectors. *Another difference is that, in medicine, many dangerous pathogens are defeated by pre-emptive action: inoculation.*

Differences aside for now, the critical stage in a war against a pathogen, whether infection or error cause, is identification. While RPT is achieving maturity in intelligent and responsive surveillance, errors are rarely detected in sectors not given to voluntary reporting. To try to fill in the picture, two recent analyses of GA accidents were consulted. One was produced by CASA, the other, the ATSB. (It was reviewed in Flight Safety Australia.) No reference is cited for either; Flight Safety Australia's database is no longer practicably searchable.

To put it mildly, neither report is helpful. The CASA analysis concludes that poor flight planning causes most GA accidents. Well, maybe, but it's hardly a basis for precision targeting. The ATSB report is even worse, a real shocker. It says that most accidents are caused by collision.[21] To get your head around that you have to conclude they count collision with the ground. And its utility as a guide to accident prevention … ?

The grim reality is – in aviation as well as medicine – that prescription of a "cure" relies on identification of the pathogen. Sensitivity testing is important – the more precise you can get the better – but first you must know what you are dealing with.

The CASA report had long been promised and I was amongst those (the few?) who were waiting. In frustration at its inconclusive findings, I conducted my own survey of reported accidents. Reviewing 300 ATSB reports, chosen at random, I more closely analysed the 54 that involved fatalities. (A copy of the summary document is attached.) All but three featured cause factors associated with:
- Decision-Making (especially failure to identify a threat),
- The presence of cause for stress (linked to threat denial), and

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[21] To be serious, reports such as this invite ridicule and diminish the pressure on accident prevention.

- Actual experience of stress (affecting both decision and aircraft handling).

Similar RAAF accident experience in the 70s and 80s prompted action. As set out in Core Concepts, accident prevention measures – once they kicked in – had dramatic effect. The accident rate dropped to zero. One issue remains unexplained, however – the link between the error- or accident-causing pathogen and individual pilot "trainability".

When the Air Force chose to alter its screening processes in the light of the "error-prone" hypothesis, the main focus was "trainability". A pilot course failure rate of 50% was deemed too high, a waste of public funds. The argument was that possession, at peak strength, of the "error-prone" attribute also rendered that individual difficult or impossible to train. New selection paradigms implemented certainly reduced the accident rate; but the effect on the training failure rate was minuscule. It fell to 45%.

Insufficient information is to hand to explain this aberration. However, there is a persuasive hypothesis: *The error-prone type is also an efficient, intuitive, learner.*

Faced with a task to be performed, he or she rapidly acquires mastery of the necessary skills. It's heuristic learning, easy, and unstressed. (Others, compelled to learn by *thinking through* the processes needed, find it harder and stressful.) In military pilot training, rapid learners prosper – at first. *To take the hypothesis further, a downside to easy, intuitive, learning is that the thought-through process is not exercised to any great extent. As a result, the supporting "cognitive muscles" are not maintained at high levels of "fitness". Use it or lose it.*

Moreover, there is a limit to which skills alone provide the solution to tough, intricate, flying challenges. Eventually, complex manipulations and procedures are encountered that call upon the highest cognitive rate humanly possible. These manoeuvres are of such a nature that only "thought through" operation will accomplish them. They are too long and complex for trial-and-error skill learning.

The students who had to think through their flying from the beginning have plenty of practice at operating the necessary cognitive mechanisms. And they are adapted to the accompanying stress levels. The intuitive learner is not: and suddenly faces three challenges:
- Learning how to learn complex tasks,
- Learning the complex routines/manoeuvres, and,
- Learning how to do the former while coping with unfamiliarly severe stress loads.

Most can't cope. They fail flight assessments. Failure begets failure: The term "down-hill spiral" is commonly applied. It is otherwise seen as "performance failure under stress". *This is also the syndrome characteristic of the error-prone type.* The error may be failure to recognise the onset of a threat – a subliminal stress avoidance strategy – or it may be the more straightforward manifestation of lower-than-normal *collapse-under-stress* threshold.

The Air Force experience shows that this particular pathogen no longer gets into the pilot force. The continuing high failure rate on pilot course suggests that it is not the selection process, alone, that can take credit. More likely is that a combination of selection and the nature of the training does it. In other words, the pilot course is acting as an extension of a selection process designed to "weed out" this personality type, the *syndrome-carrier*.

Some students who were earlier seen to be efficient intuitive learners do not fail when they experience the first setback. As the learning-demand gradient gets steeper, they falter, for sure. But they realise they have to "change gear" in their learning style. The old system won't work anymore. They take on the challenge; typically adopting strategies such as breaking the complex manoeuvres down into component "chunks" and working on them repeatedly during their own time. ("Part-Task Training.") Some benefit from insightful instructors. Whatever, the clear conclusion is that *you can train through the "stress barrier"*.

As noted earlier, many pilots who fail an Air Force course go on to successful careers as airline pilots. Prima facie, the civilian flight training and development continuum leading to the door to the flight deck contains no obstacle likely to expose the syndrome; at least to full view of a safety authority or other interested party. Insofar as this is a safety concern – albeit a latent one, and for which trigger events are one-in-ten-million probability – it must be seen as a defect in the current pilot training system. On the other hand, the evidence suggests that the right sort of training will bring the gremlin under control.

Confidence in the potential for training to resolve cognitive competency shortcomings in individuals comes from an unexpected source. The role of Neuroscience in adding to our knowledge of how learning takes place is the key factor in delivering certainty as to such outcomes. Understand the nature of synaptic modification as the basis for learning "storage", and the accompanying effects of age and training delivery strategy, and you enable precise, intelligent, planning for optimum training uptake. Further, the ground is established for before-and-after competency appraisal as well as through-training control mechanisms.

These matters are discussed in greater length under *"Learning"* on the website. Suffice to say at this stage is that the RAAF experience, interpreted in the light of Neuroscience, proves an essential component of the overall thesis: that *training will overcome latent preferences for intuitive learning and enable full development of the critical competencies.* Again, they are described and briefly analysed in Core Concepts, and described as: *The ability to maintain Situation Awareness under stress.*

Conclusions

The Project started with research aims. Early signs were that the journey would run out of fuel before it got to the front gate. Accordingly, a change from research to "practical project" was recommended and accepted. Instead of **R**&d, it became r&**D**.

Results include the line of argument laid out above. Noting the imperative nature of one initiating factor – the shortage of airline-ready pilots – the Project developed reference materials for the first stage of a High Effect training scheme – preparation for instructor training.

While observation (before and during the Project), experience (as an instructor, and from discussion with instructors) and ratiocination lend powerful support to the overall thesis, it remains, nonetheless, just that: a hypothesis.

The argument can be summarised as:
- A safety factor has been discovered.
- It is linked to individual aptitudes.
- They, in turn, are definable by the cognitive competencies they rely on.

- These abilities are related to "trainability".
- Objective appraisal of the fitness levels of the cognitive competencies is feasible.
- That is, the safety factor can be defined and its potential quantified.
- The idea that to manage something, you must to be able to measure it – is thus satisfied.
- The concept of "fitness" is vital to any scheme to improve the safety factor's potential.
- Subsequent testing establishes training effectiveness (and, in this case, efficiency, too).
- But above all, first you must know what it is you want to measure.
- The Project has identified the competencies to be strengthened.
- Reference to Neuroscience establishes the key components in High Effect training.
- The key training issues highlighted by Neuroscience are those of "Effect" and "Intensity". Complex issues, they are, however, clearly seen to be essential ingredients in planning High Effect learning.

At best, the end of a *preliminary stage* to a Project has been reached. A supporting "Action Plan" is on the website. It addresses issues such as accreditation of the training envisaged (ASFA to have this role). In short, a base has been established that will support a start to instructor training in High Effect theory and methods. Experience in conducting the first course will augment the capacity to do it better – to deliver the same maximum impact – and so on. Please feel free to contact me with questions.

Further details on Project accomplishment and outcomes, to this stage, follow:

Project Outcomes

Overall – 55 days' effort produced 105 pages containing approximately 21,000 words and 145 graphics (depicting models and functions).

Project outcomes are accessible through this "Key Concepts" document on the website:
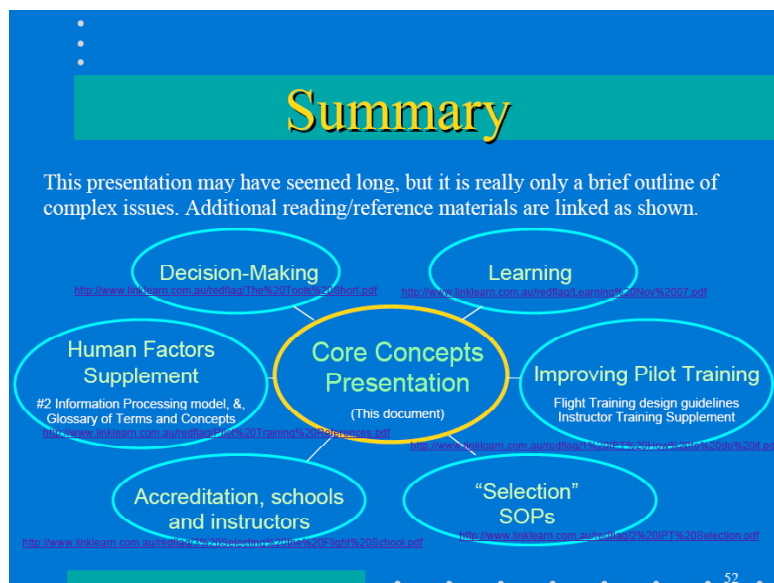
Please bear in mind that these are references for training. Learning sessions within a structured syllabus support their content. Practical exercises reinforce the lessons.

Key Concepts

The main *safety* arguments for High Effect training are set out in this document. It has only a snapshot of the critical Human Factors issues, and more is supplied in the other references.

Learning

A critical publication: Venerable learning theorems are re-visited in the light of new understandings from Neuroscience. As a result, training patterns, exercises and routines of genuinely high impact can be designed and conducted.

Decision-Making

Contains models/explanations for Decision functions, in addition to those in Key Concepts.

Human Factors Supplement

Expands on the Information Processing model in Key Concepts; to include a Glossary.

Improving Pilot Training & Accreditation

Guidelines for ab initio pilot training courses embracing both High Effect training and related instrument promoting higher levels of professionalism.

Selection

Guidelines for self-appraisal for desired piloting and safety competencies.

Conclusions

The present reality is grave – and carries implications for future safety problems for decades ahead. That suggests that urgent action is needed on several fronts. Such actions would include provision for better pilot training, effected through improved instructor competencies.

Recommended*: Extension of the Project to cover full development of instructor training support references. (Fast-track action is appropriate, and oral discussion the primary planning instrument. If CASA intends to accept the proposal, enough detail will be supplied to get started with; more to follow.)*

In terms of the original intent, the Project is destined to conclude, on the amended finish date, with a complete suite of training references to hand. Those references will focus on instructor knowledge, preparation and training. They will be in "first draft" – but not such as to inhibit the training activities envisaged.

Recommended*: No action on CASA's part is needed for completion of the reference texts and materials. A watching brief is made possible through the website.*

At Project-end, instructor training activity will be underway. As it progresses, the reference drafts will be improved until worthy of formal publication. More important, the instructor training is intended as a "breeder reactor" activity to perpetuate the higher quality training and enable rapid spread of benefits. One option is to permit this line of development to continue as a commercial operation. Alternatively, CASA might accelerate progress through provision funding support.

Recommended*: In view of the urgency of the "airline-ready" pilot shortage situation and the related safety implications, CASA should lend support to fast-track processes through which to redress the most critical factors. That would include full support to development of:*

- *Higher-quality instructor training,*
- *Courses to accelerate progress through the "instructor tiers" – eg, Grade 2 to Grade 1.*
- *A "Bridging Course" for low-hour pilots to ready them for passenger-carrying service.*

The Project will make available references for such training. They will be truly competency-based – a poorly understood term – and therefore compatible with pre-training diagnostic routines and through- and post-training objective appraisal of outcomes. The better training will displace experience requirements for professional pilot recruitment. The appraisal framework will provide quality assurance. However, achievement through these courses would not be recognised with existing certificates and awards.

Recommended*: CASA should recognise Certificates of Qualification awarded by schools conducting **High Effect** training.*

Finally, the extraordinarily supportive feedback received after public presentations on the Project and its intended work offers an insight – albeit limited – into the potential for CASA to enhance its image through such responsible, clearly safety-positive, activity. More of the same, and bigger, can only redound in favour.

9 November 2007
0421 580 92

R E S U M É

Dr. Geoffrey Peter DELL.
PhD, M.App.Sci., Grad.Dip.OHM, CFSIA, RSP (AUST), MISASI
Managing Director, Protocol Safety Management P/L

Date of Birth: May 8, 1955

Phone: (BH) 9449 1445
Fax: 9449 7118
Mobile: 0418 367 569

E-mail: gdell@protosafe.com.au

Postal Address: PO Box 2069
            TAYLORS LAKES   3038

1.   CAREER MISSION STATEMENT

My career objective is to achieve excellence in the research and delivery of contemporary best practice systems safety and environment solutions, investigations and analyses. Provide strategic guidance and leadership to the management of safety and environment in industry. Mentor executive management, staff and employees to achieve continuous improvement in accidental loss reduction, enhance corporate operational standards and protect the welfare and quality of the working lives of all persons associated with conduct of their businesses; employees, customers and the public. Provide vision and leadership to the Australian safety profession by involvement in the relevant professional associations at executive and board member level.

2.   CAREER LANDMARKS & AWARDS

♦ In 2002, at Government House, Canberra, Geoff Dell was inducted by the Governor-General of the Commonwealth of Australia to the position of Dean, College of Fellows, Safety Institute of Australia, to lead the technical safety science and academic efforts of safety professionals in Australia.

♦ In September 1996, in Dubai, United Arab Emirates, Geoff Dell was awarded the Washington DC based Flight Safety Foundation's inaugural Ramp Safety Award for development of engineering solutions to fatal aircraft pushback run-over accidents. Since their introduction in 1993, the solutions have become the global industry standard having been adopted by many major airlines worldwide and have effectively eliminated these occurrences across the industry.

♦ Geoff Dell was awarded the University of Ballarat/VIOSH Eric Wigglesworth Award in July 1997, for excellence in publication of a safety science research paper in a refereed scientific journal

3.   BOARD AND PROFESSIONAL APPOINTMENTS

Dr Dell's present appointments include:

♦ Elected National President of the Safety Institute of Australia in 2006

♦ Appointed to the Programs Advisory Committee, RMIT Faculty of Aerospace and Aviation, June 2005

♦ Appointed to the Board of Directors of the Aviation Safety Foundation of Australasia 2003 to present

♦ Dean, College of Fellows, Safety Institute of Australia, 2002 to present

♦ Member, National Board of Management, Safety Institute of Australia since 1990

♦ Visiting Lecturer in Risk Management and Occurrence Investigation, Ballarat University and RMIT University undergraduate and post graduate OH&S Programs

♦ Member of the Standards Australia AS4360 Risk Management Standard Development Committee.

♦ Appointed to the selection board for the Flight Safety Foundation (Washington DC) Ramp Safety Award in August 1998 to present.

♦ Appointed Australian Society of Air Safety Investigators, Membership Committee Chairman, 1984 to present

His previous appointments include:

♦ Elected President, Victoria Division, Safety Institute of Australia, 2002 to 2005

♦ Elected Federal President of the Safety Institute of Australia Inc. from 1996 to 2002.

♦ Appointed to the Board of Directors of the Australian Injury Prevention And Safety Association Inc. (IPSO Australia) 1998 to 2004

♦ Appointed to the Board of Directors of the QSA Register of Certified Auditors February 1997 to June 1999.

♦ Part-time Senior Research Fellow, Monash University Accident Research Centre 1998-2001

♦ Appointed to the Victorian Workcover Authority, OH&S Advisory Panel 1998 to 2000.

♦ Appointed Chairman of the Ergonomics Committee of the National Safety Council of America, Air Transport Executive in 1994 and 1995.

♦ Appointed to the Assessment Panel of the National Safety Council of Australia - Safety Auditors Register in July 1997

♦ Elected Chairman of the Australian Dangerous Goods Air Transport Council 1986 to 1995

♦ Elected Secretary of the Australasian Airlines Flight Safety Council 1983 to 1991

♦ Appointed Member of the Aviation Industry Ministerial Advisory Council (AVIAC) Committee on Aviation Safety Education 1984 to 1988.

4.   OTHER CAREER SUCCESSES

♦ Appointed by the West Australian Government and BHP Billiton to lead the independent multi-disciplinary and multi-national investigation into the causes of the fatal explosion at Boodarie Iron, Port Hedland WA on May 19, 2004.

♦ Conducted the safety management systems review for Esso Australia at the Longford Plants, following the 1998 fatal explosion incident.

♦ Conducted a three year review (1998 to 2001) of the safety management practices of eighteen large Victorian companies for WorkSafe Victoria and Monash University Accident Research Centre.

♦ Reviewed the safety management arrangements of the top 150 companies on the Australian stock exchange from 2000 to 2003 for the Reputation Measurement Index and Westpac Ethical Investment Funds

♦ Led the team that developed and introduced an independently certified Occupational Health and Safety Management System to the largest Pulp and Paper Mill in Australia, May 1997.

♦ In 1994, led the team which introduced Standard Operating Policies and Procedures in Qantas ground operations at airports worldwide.

♦ As Secretary of the Australian airline industry Flight Safety Council in the early 1980s, successfully lobbied the Federal Government to legislate for a smoking ban on all Australian domestic regular public transport flights.

♦ Investigator in Charge of several hundred major accident investigations, including several fatal accidents, many serious personnel injury accidents and several total aircraft loss accidents, 1979 to present.

5.   RELEVANT EMPLOYMENT HISTORY

January 1996 to Present: Managing Director and Principal Consultant, Protocol Safety Management Pty Ltd

As Principal Consultant and Managing Director, Dr Dell is responsible for leading Protocol's team of system safety, risk management and environmental science consultants.

Protocol is an international safety management consultancy. PSM has consulted in system safety, risk management, OHS, environmental management, accident investigation, human factors, safe operating procedures development, quality processes and practices, emergency planning and dangerous goods, quality and environmental management to a range of industries including: airline (flight and ground), aerodrome operations, power plants, pulp and paper, hospitality and catering, holiday resorts, transport (road and rail), forestry, building, construction, manufacturing and engineering.

Developed and implemented safety management systems to AS4801 and CASR 119 for a large number of companies such as Qantas, QFCL, Australian Paper, Amcor, FreightCorp, Melbourne Airport, Museum Victoria, Darwin Airport, Age Print Centre. Conducted full systems analyses for Esso Longford

Major clients include: Intedev, Monash University Accident Research Centre, Sydney Airports Corporation Ltd, Australian Paper, Amcor, Qantas, ESSO, CSL, Vanair, Air Vanuatu, Virgin Blue Airlines, Aerolineas Argentinas, NSW Rail Infrastructure Corporation, Pacific National Rail, BHP Billiton, Pacific Brands and RailCorp NSW.

Protocol has a client satisfaction focus while maintaining the highest possible professional ethics in program and service delivery.

Recent Major Projects Include:

◆ Safety management advice and leadership to the Project Director, staff and workforce delivering the Australian Synchrotron Project at Clayton Victoria. The project involved installation and commissioning of equipment and machinery at the leading edge of global synchrotron technology involving an Australian and European workforce dealing with high voltage power, ionising and non-ionising radiation and strong magnetic fields. The project spanned almost two years mid 2005 to end 2006 and remained lost time injury free throughout.

◆ Peer review of the end user OH&S risk and fire and life safety aspects of the design, construction methods and practices of the Parramatta Rail Link Project 26km of tunnel and 12 underground railway stations in the planned new rail line linking Chatswood and Parramatta 2000 to 2004.

◆ Safety management advice and leadership to the Project Director, staff and workforce delivering the Age Print Centre, Tullamarine. The project involved development of a full safety management system to Australian Standard AS/NZS4801 to position the Centre for transition from commissioning to revenue operations 2002.

**September 1992 to December 1995: Manager Safety Melbourne,
Qantas Airways.**

Geoff Dell's principle accountabilities were for the management & leadership of Qantas Safety Department Melbourne Office with responsibility of oversighting the Qantas shorthaul (domestic) operations. He also chaired the Qantas Airways Corporate Ground Operations Safety Committee and was a member of the Qantas Airways Dangerous Goods Committee, Major Aircraft Accident Investigation Team and the Qantas Threat Assessment Team.

1990 - September 1992   Manager Ground Operations Safety, Australian Airlines.

Principle accountabilities included management & leadership of Ground Operations Safety Department. Geoff Dell also Chaired both the Australian Airlines Ground Safety Committee and Dangerous Goods Committee and was a member of the Major Aircraft Accident Investigation Response Team, Member Threat Assessment Group and the Anti-Hijack/Extortion Crisis Management Group.

1979 to 1990: Flight Safety Adviser, TAA/Australian Airlines.

Responsible for co-ordination of the airline's Aircraft Accident Prevention Program and was a member of the Major Accident Investigation Response Team. Geoff Dell was Secretary of Australian Airlines Flight Safety Committee, Chair of the Australian Airlines Dangerous Goods Committee and Editor of the Airline's Quarterly Safety Journal

During this tenure, he completed the TAA B727 pilots' course including all ground school and flying sequences in the B727-276 flight simulator.

1977 to 1979:   General Aviation Pilot

1974 to 1977:   Engineering Trainee, Trans Australian Airlines

6.   RECENT MAJOR PROJECTS

Safety and Environment Compliance, RailCorp NSW Major Infrastructure Projects, 2007

Conducted a compliance review of twenty RailCorp Major Infrastructure Projects against the NSW OH&S, Rail Safety and Environment Protection legislation. The project involved site inspections, interview of the project managers and review of project documentation. Recommendations were made for changes in safety and environment structure, specialist support and ongoing surveillance of project safety and environment compliance.

Ash Eruption & Fire ball Accident in Victorian Power Station, 2003

Led an independent enquiry, on behalf of Silcar Maintenance Services, Power Division, of a fire ball eruption accident at Yallourn W Power Station in 2003. The team included specialist engineers and safety systems expertise to identify the sequence of events and precursor conditions leading to a 40 metre fireball eruption from an electrostatic dust precipitator during precipitator cleaning operations that seriously burnt one worker and two others received minor injuries. The enquiry identified flaws in plant isolation practices, maintenance tasks, hazard analysis methods, plant knowledge, systems of work, training, rostering, emergency response and recovery arrangements

Major rigging failure and crushing accident in Qld Power station, 2003

Led an investigation team to investigate a rigging failure and major crush injury accident at Wivenhoe Power Station in 2003. The team included engineering and legal representation to identify safety system failures which led to a 4 tonne generator rotor pole falling on maintenance workers. The enquiry found shortcomings in maintenance procedures, lifting practices, work scheduling and supervision arrangements.

Management Systems Investigation at Esso Longford Gas Plant, 2000.

Led an independent investigation team, including engineering, human factors and system safety specialists to identify shortcomings in the application of Esso Longford's Safety Management Systems during the company's recovery from the 1998 explosion incident. The enquiry, in part, looked at the Esso's arrangements for identifying and responding to plant major failure mode onset, critical operating procedures training of key personnel, operations safety culture and plant maintenance. Key recommendations included adaptation of operations simulators for failure mode onset recognition training. The investigation was conducted on behalf of the Monash University Accident Research Centre and Victorian Workcover Authority. The enquiry was conducted over a 3 month period in 2000.

Runaway Train Accident Investigation, Port Kembla, 2002

On behalf of the NSW Government Rail Freight Corporation, FreightCorp, led an independent investigation into a coal train collision accident at Port Kembla that included rail infrastructure specialists, engineers, driver training and human factors personnel. The enquiry analysed train crewing, training, locomotive design and operation, as well as corporate culture and management systems to identify the failures which lead to the runaway. Key recommendations related to crewing pairing practices, human factors training and locomotive design.

Runaway Train Accident Investigation, Lithgow, 2002

On behalf of the NSW Government Rail Freight Corporation, FreightCorp, led an independent investigation into a runaway diesel locomotive collision accident at Lithgow. The investigation involved medical, rail infrastructure specialists, engineers, driver training and human factors personnel. The enquiry analysed train crewing, training, drugs and alcohol issues, locomotive design. The investigation relied on the earlier incident (above) with regard to corporate culture and management systems review. Key recommendations included driver training, rostering arrangements and drug and alcohol programs.

Runway Incursions Investigation, Sydney Airport, 1998

On behalf of Sydney Airport Corporation, led a team of engineers, pilots and human factors specialists investigating a spate of nineteen flight incidents involving vehicles and aircraft crossing the runway at Sydney airport in the path of aircraft taking off or landing. The enquiry lasted nearly 4 months and revealed shortcomings in airport radar systems, air traffic control procedures, communications systems and procedures, vehicle control and driver training.

Other Major Investigation Experience

Dr Dell has been conducting major accident investigations since 1980 and has extensive experience leading multidisciplinary investigation teams. His other major investigations include:

- Total aircraft Loss (Fokker F27) flight Accident, Amberley, 1986
- Total aircraft loss (Twin Otter) flight accident, Dunk Island, 1988
- Fatal accident to maintenance engineer, struck by F27 propeller, Hobart Airport, 1980
- B767 structural asymmetry – incorrect engine cowling fitted during extended period of line operations
- Fatal forklift Accidents at Dandenong and Brunswick, 2003
- Runaway Airbus A330 - towbar disconnect collision at Melbourne, 2004
- Spate of B737-800 towbar disconnect incidents at Brisbane, 2006

Other Safety Systems and Safety Culture Reviews

Dr Dell has been conducting safety systems and safety culture audits since 1980 and has extensive experience leading multidisciplinary audit teams. Other significant audits he has led include:

- Fidelity audit of Qantas computerized aircraft weight and balance & centralized load control systems, 1994
- Third party audit of helicopter and fixed wing operators for Telecom Australia, 1994
- Whole of operations systems audit of Ansett Australia , 1996
- Safety systems review of Aerolineas Argentinas flight operations, Buenos Aires, 1997
- Safety culture and compliance survey of Australian Aerial Agriculture pilots and operators, 2005
- Human factors review of the Robinson helicopter factory delivered pilot safety program, 2006

7. EDUCATION

Dr Dell's qualifications include:

♦ PhD, University of Ballarat, completed 2006

♦ Master of Applied Science Degree, University of Ballarat 1994.

♦ Graduate Diploma in Occupational Hazard Management, Ballarat University College 1986.

♦ Major Accident Investigation Management Certificate, Bureau of Air safety Investigation (now ATSB), 1986

♦ Advanced Accident Investigation Certificate, Bureau of Air Safety Investigation, 1984

♦ Aviation Accident & Safety Program Management Certificate, University of Southern California, 1980

8.　TECHNICAL PAPERS AND PRESENTATIONS

Papers presented or published include:

1. Dell G, "*Aerial Agriculture Accidents 2002 to 2005: The Human factors and System Safety Lessons*", in Multimodal Safety management and Human Factors (Anca J. Ed.), Ashgate, Aldershot, 2007-09-14

2. Dell G. "*Measuring Baggage Handler Back Injury Risk: A Triangulation of Methods*", Presentation to the 2007 Annual Seminar, Human Factors and Ergonomics Society, Melbourne, August 2007

3. Dell G, "*Effective Safety Management: Safe design, Human Factors and Culture*", Presentation to the Human Factors in Transport Conference, Lloyds List, Melbourne, August 2007

4. Dell G, "*Risk Perception and Accident Analysis*", Presentation to the IIR Bulk Materials handling Conference, Brisbane, July 2007

5. Dell G, "*Safety Culture: Methods & Techniques for Successful Investigation*", Presentation to the Safety In Action 2007 Conference, Safety Institute of Australia, Melbourne, March 2007

6. Dell G., "*The Causes And Prevention Of Airline Baggage Handler Back Injuries: Safe Designs Required Where Behaviour And Administrative Solutions Have Had Limited Effect*", PhD Thesis Monograph, University of Ballarat, February 2007

7. Larsson, T., Mather E. and Dell G, "*To Influence Corporate OHS Performance Through the Financial Market*", International Journal of Risk Assessment and Management, Vol. 7, No.2, 2007, pp263-271, Inderscience Publishers, Geneve, 2007

8. Dell G, "*Aerial Agriculture: The Future Safe Operations Need*", Presentation to the Safety Conference Sydney 2006, Safety Institute of Australia, October 2006

9. Lenne M., Ashby K., Regan M. & Dell G., "*The AVSafe Project: Incorporating the analysis of human error into the investigation methods for aviation insurers*", Australian Aviation Psychological Society Annual Seminar, Manly, June 2006.

10. Dell G, "*Order is Better than Chaos: But Safety Management Systems No Panacea*", Australian Society of Air Safety Investigators (ASASI/NZSASI) Conference, Melbourne, May 2006

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9.   PROFESSIONAL REFEREES

- Professor Tore Larsson, Royal Institute of Technology, Stockholm, 0011 46 87904821
- Professor Dennis Else, Former Chairman, Australian National OH&S Commission 0431 471 430
- Dr Eric Wigglesworth, Senior Research Fellow, Monash University Accident Research Centre 03 99051856
- Dr George Rechnitzer, Director DV Experts, 0418 998 158
- Mr Max Noy, Former Head of Engineering, Mobil Australia, 0419 515 652
- Mr Michael Paynter, Director, Intedev, 03 9690 5533

10.   SPECIAL INTERESTS

- Aviation – General Aviation Flying
- Flight Simulation
- Golf

Attachment F – CV – John Douglas Edwards

1962-1987	RAAF	Fighter pilot, base safety officer, accident investigator, flying instructor, fighter tactics instructor, squadron executive, staff officer, diplomat (US), major unit CO, RAAF Director of Training, base OC.

Significant achievements

Promoted to Group Captain at age 37.

*As Training Director, headed project to streamline RAAF training, saving 300 man years of 'lost' time. **Parallel study of flying training resulted in reduced failure rate in pilots' courses.***

*As Training Director (and subsequently) led RAAF development of tests that reveal "error-prone" attributes in pilots – and **lowered the accident rate subsequently**.*

As Base Commander, RAAF East Sale, led 15% annual increase in productivity, over 2 years (measured as student output, from 6 schools, with no additional staff).

1987-1989	Qld Law Society	Continuing Legal Education (CLE)

Significant achievements

Introduced competency-based training design to all CLE activities. Assist CLE Director to arrange and deliver full range of CPD activities.

Design and implement management training course for Queensland solicitors, incorporating Error Management. (Practice Management Course was intended to reduce "accident rate" in solicitors' offices. Insurer at time fore-went PI insurance premium increase on promise of fewer claims.)

1989-1990	Consultant to Qld law firms	Management & Risk Management training

Significant achievements

Provided in-house courses in management systems and techniques.

1990-1996	Family Court of Australia	Regional Manager, North Region (Coffs Harbour to Darwin, incl Alice Springs) 15 units, 110 staff.

Significant achievements

Implement staff training and leadership programs – highest 'production' statistics (eg, numbers of files-opened-per-staff-member), most cost-effective Region (of four).

Throughout, active on RAAF Reserve, developing/teaching International Humanitarian Law (originated concept of "<u>Code of Ethics for the Profession of Arms</u>") doctrine to lawyers and combatants of all three Services, Australia-wide. Wrote Law of Armed Conflict chapters for RAAF Manual of Air Power, designed wargames for lawyer-training workshops, participated in many related management-of-training activities.

1996-2006	Aviation safety system and training course developer Independently and through Aviation Australia, Eagle Farm

2005-2008	Develop error prevention systems in other professions (law, accounting and medicine), using aviation models as start point. ***Member, CASA SCC, Co-Chair, CASA Airspace Groups***

Significant achievements

Motivated by personal experience to reduce aircraft accident rate through development of training packages. (85% of aviation accidents are preventable.)

*Wrote highly regarded book, **Fit to Fly**, many articles published, international recognition as result.*

Recent training products include these courses for pilots, maintenance engineers, aviation managers and emergency service crews (QFRS):

> *50% of a **Manual of Human Factors** – the bit focussing on judgement/decision,*
>
> *The "**Red Flag**" system – practical Risk Management.*
>
> *Generic experiential learning Error Management (EM) seminars.*
>
> *Safety Management Systems (based on CASA guidelines).*
>
> *Competency Management.*
>
> *Accident Investigator.*
>
> ***Decision-making under Stress** (for Queensland Fire and Rescue crews).*

*Actively participated in start-up of Aviation Safety Foundation Australia (ASFA) (Executive Committee member), drafted ASFA 'Code of Practice', wrote training and accreditation policies, papers on professionalism, authored pace-setting booklet on **Learning in Aviation**.*

*More recent publications include: **On Human Error** and **Performance Under Stress.***

Design of Part-Task Training devices and Error Management skill testing and enhancement routines.

Maintain contact with clients in aviation community, operate Error Management skill "fitness" appraisal paradigms and devices.

Design of handheld-PC-based fatigue management program.

Through experience in assisting stroke victim rehabilitation, noted Neuroscience issues in learning and consequent potential to enhance training guidelines and prescriptions in every field – but especially in training professional pilots.

Major Australian underwriter recognises risk-abatement effect of EM and RM training through insurance benefits, typically premium discount.

Act as mentor to GA flying instructors at Archerfield flight schools, encouraging professional standards and fostering more scientific methods and learning.

*Conduct research into **High Effect** pilot training methods, design Guidelines for same.*