GroundEffects

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CAN THE OLD DOG LEARN NEW TRICKS?

Many of the books, articles, conferences dedicated to safety and which one can learn from focus on making the system fool-proof, and, as one of them writes, "building dikes against human frailty", often with the assumption – stated or implied – that "you can't change human nature".

You can't change attitudes, is a statement frequently expressed with feeling. It's true, too… **if it's someone else's attitude you are trying to change.** If the old dog chooses to cling to his ways, you're on a losing wicket. But, now, if the old dog **wants** to learn, try and stop him!

My colleagues and I contend that the aviation industry – like any other hazardous industry - **can** help their employees become more "error-proof", **can** help them reduce lapses of attention, or errors of judgement, and that unless they do so, the accident record will not improve much, no matter how much attention they pay to improving systems.

Helping their employees become as "error-proof" as possible means helping them grow in their ability to understand themselves and others, to understand their own personal vulnerabilities to their being distracted by external or internal events and to mitigate them, and to become more comfortable with themselves and others.

If the industry invested in such training for their employees, would it make any difference? **Can** attitudes and behaviour change in a deliberate and positive direction?

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The 14th International FAA/ CAA/Transport Canada Human Factors in Aviation Maintenance Symposium was a success

And what a success it was. There were over 400 attendees from 28 different countries that attended this international symposium in Vancouver BC. This made it the most successful of the symposiums to date and a far cry from the first back in 1988 where, according to the moderator, Dr. Bill Johnson Vice President, Galaxy Scientific Corporation, there were 30 attendees, 10 of whom were speakers.

With a theme of *"Safety Management: Theory to practice"*, it was only fitting that the keynote speaker be Dr. James Reason. Professor of Psychology, University of Manchester. As

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GroundEffects would like to extend our thanks to the following companies for their generous contributions.

AIR CANADA

Help us to prevent accidents before they happen!

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DEVELOPING A HAZARD MODEL FOR AN AVIATION SAFETY CASE

- SAFETY MANAGEMENT SYSTEMS

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This article is an adaptation of a paper presented to a safety seminar organised jointly by the Flight Safety Foundation (FSF), International Federation of Airworthiness (IFA), and International Air Transport Association (IATA) in Rio de Janeiro in November 1999. An is reproduced in this magazine with the permission of ICAO Journal, who first published the article in February 2000

Developing the generic hazard model for use in safety cases
The case for the Safety Case

SAFETY improvements have been achieved over the years through numerous developments, including better aircraft design, redundant systems, improved working practices and the introduction of quality assurance programmes, to name just a few.

Despite all that has been accomplished, experts predict a proportional increase in the number of aircraft accidents as world-wide air traffic continues its steady growth in the years ahead. Unless significant changes are made to improve the nearly flat accident rate, by 2010 there could be an average of one airline accident per week. Left unchecked, this level of accidents would alarm the public and could place many aircraft operators in financial difficulty or even out of business. For that reason alone, the cost of enhancing safety systems is easily justified.

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To further decrease the accident rate, safety management needs to be perceived by senior management — especially a company's chief executive officer and board of directors — as an essential business requirement and not an activity to be addressed only by subordinates. The introduction of a safety case offers a company's senior management the opportunity to identify the major safety risks. Based on this knowledge, a company's board can establish controls that reduce the likelihood of such risks causing an accident.

The commitment and organisation that assures continuing safe operations is achieved through the introduction of a safety management system. A safety management system must be led by top management and must address all aspects of the business that have the potential to cause harm.

The structured approach taken to identify, assess and control the hazards is known as hazard management, a process that results in the development of a hazard register. Throughout 1999, Shell Aircraft worked with a number of airlines and other operators to build a generic hazard register (*Figure 1*) that can be tailored to any operator, enabling resources to be focused on the areas of greatest risk. An efficient way to manage this process is the Safety Case.

Developing the safety case

A company's safety management system, which is defined as a systematic and explicit approach to managing risk, is largely a loss control management system. It defines how the company intends to manage safety as an integral part of its overall business. A safety management system addresses all aspects of safety in the operation and should deal with all levels of risk. By comparison, a safety case focuses on specific parts of an operation and addresses only the major hazards, such as the potential for fatal accidents, which are critical to the company's well being. Although a company's safety case is subordinate to its safety management system, they should interact so that each safety case assures control of its hazards. The safety management system and the safety case are linked in many ways, primarily through the hazard registers, with the safety management system's hazard register as the master list of all hazards.

The key steps in developing a safety case require that a corporate safety management system exists or at least is being developed. The safety case draws on corporate safety objectives and safety policy, which must make safety an explicit priority, at least equal to any other business imperative. Based on corporate decisions as to what safety level is to be managed, hazards are identified and risks assessed and controlled. Management must also develop and maintain a supportive culture that is "just" and "learning." In aviation, this cultural change requires a willingness to learn from hazards and threats as well as from accidents and incidents. At the same time, management must deal sensitively with those responsible, unless reckless or deliberate behavior warrants disciplinary action. It is essential that training provide all staff with an understanding of safety management and the extent of the corporation's commitment to safe operations.

A safety case is the "systematic and structured demonstration by a company to provide assurance, through comprehensive evidence and argument, that the aircraft operator has an adequately safe operation." The company identifies and assesses major hazards and safety risks and then manages them to levels of risk which are as low as reasonably practicable. A safety case may cover all or part of an operation and, where more than one case is developed, each is described and controlled locally but managed through a corporate safety management system. Delineating cases is a management choice, but the resulting package of safety cases should cover all safety-critical activities. Safety cases may be set up for operations, for engineering, or both, or even used for specific projects such as the introduction of a new aircraft type.

Development of a safety case begins with identification of what should be managed, and by describing the boundaries of each case and establishing how a corporate safety management system is applied. The safety case should list safety-critical activities undertaken by a company and who is accountable; it also should identify which hazards pertain to each activity. Hazards are listed and analysed to identify threats, escalations and controls necessary to forestall hazards; this forms the hazard management section, an output of which is the hazard register. The safety case should list measures required to improve safety. At the completion

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We believe so, based on our twenty-five years of working with *The Human Element.*

Now, it's true that no one can **make** anyone change; no one has ever **made** someone else lose a pound, or stop smoking either. But the leverage is different if the changes a person is seeking are **in himself** – where **only he has control.**

The key, then, is how to encourage people to w**ant** to change? *What makes a person **want** to change?* Over the years, we have identified three givens that must be there if a person is to make deliberate changes in attitude and behaviour :

1. He has to recognize that some of his behaviours are limiting

   him and/or others, or hurtful to him and/or to others
2. He has to be uncomfortable about it

- And - perhaps the most important part -

1. He has to discover that change is possible.

For many of our clients (especially those who have had - like many aviation maintenance groups – very little exposure to "soft" training) the revelation that change is possible for them comes when they understand this one piece of information : **much of what we call "personality" is in fact a series of psychological habits** which we have copied, developed, created, adopted over the years. Some of them explain our successes, some of them explain our failures or our sufferings.

You see, for anyone who believes that "personality" is a genetic straightjacket, change is impossible – he is helpless. ("Can I change the colour of my eyes?" "I've **always** been this way." "It's my nature." they say, referring to their short fuse, or to their tendency to sulk, or to their fear of expressing their thoughts and feelings. "My father was like that." As long as they see themselves this way, they are stuck in their current state of being.) For others, like incompetent change agents, or like old dogs who **want** to cling to their ways, these sayings are convenient excuses for impotence or inaction.

In fact, they are wrong : it isn't true. Our attitudes and behaviours are, as I said earlier, a series of psychological habits that we use so "naturally" that we have forgotten that they are choices we have made.

One man says, "He provoked me, so of course I got angry." What he is saying is, "I've never stopped to think that I might do something different in response to (what I perceive as) provocation." He could, for instance, ask, in an inquiring tone, "What do you mean?" He could say to himself, "Joe is doing his number again; I'll come back and talk to him later." He could laugh and say, "C'mon, Joe, let's not get into it, we've got work to do." In other words, he has dozens of options. But his habit is so well ingrained that any real or perceived provocation will - like a knee-jerk response – almost guarantee a predictable reaction.

Our success with our clients lies largely in our ability to tap into their desire to improve their life : an aspect of our work which continually delights us is the **willingness** of our clients to make use of new information. Mind you, this is an admirable characteristic of aviation (No one ever says, "Here's a better, safer, faster way to fix this component, but I won't bother using it"). The fact is that – given the opportunity – **just about everyone** will take advantage of new information that he can use to make his life less complicated, his relationships easier, his stress level more controllable, his work more efficient and safer.

I believe that very few people set out deliberately to be troublesome. (Have you ever heard of anyone who looks into the mirror as he shaves each morning and says to himself, "How can I screw up some of my relationships today?") They continue because they don't know how to stop. They need new information – and it's amazing how little new information is required for some people to make important changes in their attitude and behaviour.

In the past, these opportunities to learn were rarely made available to the maintenance groups : ample technical training, but little or no enlightenment on the human side was the rule. Fortunately, this is changing.

One valuable aspect of almost any

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"soft" training is that – perhaps for the first time in his life – a person is invited to examine himself, to notice how he thinks, to see how he processes events around him, (e.g., was it **really** a provocation or am I just bad-tempered because of the traffic jam that made me late this morning?) to become curious about the fact that others around him respond differently to the same event. Many of our clients – in their thirties and forties – tell us they have spent more time understanding themselves in their four days with us, than they have in the rest of their lives to date!

We were working with a team in a manufacturing plant, one day, when an engineer said, "When I get a new machine on the shop floor, I study the thing backwards and forwards, until it has no surprises for me, I understand how it works, its strengths, its weaknesses. And today, suddenly, I am realizing that **I am the machine through which I experience my life, and that I don't know very much about it at all."** Then he laughed and said, "Of course, I didn't come with an instruction manual - and I see now that I will have to write it myself."

Many of our clients have spent most of their life focused outward – thinking of their job, planning, taking care of others - and very little time examining "their own machine".

Now, as you read this, if you think this is a great idea, you might be thinking, "OK, OK, I've got it. Now tell me how to do it." And it would be great if there were a magic one-size-fits-all formula. Here's the good news : the "cure" does not require a five-year psychoanalysis! You don't need to be or to hire a psychologist. Fortunately, there are a number of good training opportunities available, with somewhat different objectives, with somewhat different value – but the chances are that all are helpful on the way to self-improvement. Check with your friends, find out about their experiences, choose the training that is likelier to serve your purposes, and generally speaking, **look for any opportunity that can add to your self-knowledge**, and don't discount your own ability to "learn new tricks" in this area that you may not have explored before.

As you begin to notice yourself more, another good place to learn is to start listening to people's comments about you : your co-workers, your spouse ("What the hell does **she** know?" said one crusty fellow . . . until he gave it some thought!), your kids.

They might help you notice habits you have adopted that hinder your enjoyment of life; then you can see what it is you want to replace them with.

The message through all of this is : **You** are in charge. If you can, and want to, improve the quality of your life in some way, pick up your socks, and find out how to write your own instruction manual! You have proven your skills and determination at problem-solving, at trouble-shooting, at finding different ways of fixing things – apply these good talents for your own benefit! And in the process, you will be contributing to the greater safety of your industry.

Gisèle Richardson

Gisele is President of Richardson Management Associates Ltd. She was responsible for RMA's pioneering work in bringing information about the human element to the aviation industry. She has served on the Executive Board of the International Consultants Foundation, the Board of OD Canada, and is a former member of the Organization Development Institute's Advisory Board. She contributes to numerous publications here and abroad. She trained at National Training Laboratories for Applied Behavorial Sciences, studied Psychology at McGill University, is an Advanced member of ITAA, and a member of the Academy of Management. Gisele can be reached at 514 935-2593 Fax 514 935-1852

Lack of Teamwork

"I lift, you grab. ... Was that concept just a little too complex, Carl?"

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of the exercise, and each time the safety case is renewed or updated, conclusions must be drawn on how it meets the case objectives, and a statement of "fitness for purpose" provided.

An additional benefit delivered by the safety case is the interface with other service or product providers where there are shared hazards. Interfacing in this instance describes the contractual relationship between companies where a supplier is responsible for part of an activity or product and the company is responsible for another part. Typically, an airline's fuel supplier is responsible for delivering the correct product, while the flight or ground crew are responsible for its acceptance. Each shared safety-critical activity is covered by an interface document that defines precisely the point at which responsibility changes hands. The document assures mutual awareness of hazardous activities and ensures each party is clear about its responsibilities. Interface documents are typically attachments to the contract between the parties and may have legal connotations.

Central to a safety case is the identification and management of hazards. Clearly, without a robust list of hazards, a company cannot assure itself that it has established effective controls. Hazards, once identified, are assessed by utilising a safety assessment matrix to determine their level of risk. The result of these assessments requires management to make decisions as to what, if any, actions need to be taken. Without such a systematic review, it would be difficult for management to ensure that all parts of the operation needing risk assessments have been identified.

The generic hazard model developed in the workshops was designed to cover only those hazards that would be common to a wide range of airlines or helicopter operations. Each individual company, using the generic hazard model, needs to account for specific hazards (i.e. the aircraft type, the location, or the existence of non-standard operations). A hazard, once identified, must be contained through procedural, organisational or physical controls. These measures alone are not enough as they can be circumvented if their purpose is not well understood, or if there is a lack of commitment by anyone involved. Training, assurance, awareness and accountability are all needed.

Identification of hazards started with the definition of each hazard and what analysis tools would be used to define them. In the safety case described here, standard tools and definitions that had been used successfully elsewhere were employed. The primary tools were the "bow-tie" analysis model and a risk matrix. The bow-tie has proactive and reactive elements (*Figure 3*) that systematically work through a hazard and its management, using a methodology that Shell Aircraft calls the hazards and effects management process (HEMP). This requires that the hazards be identified, assessed and controlled — and also sets out recovery measures.

The bow-tie output is tested against a risk assessment matrix adapted for aviation . Judgements are made as to the probability or frequency of a hazardous event and the severity of its consequences. The hazardous events that are seen as safety-critical to the operator are added to the company's hazard register. Senior management must then decide what level of risk the company will accept in order to manage hazards. If the likelihood of an occurrence is judged to be extremely remote, it may not be worth expending significant energy or resources on managing the risk. Conversely, if hazardous events are frequent and the consequences are minor, but could escalate, it would be appropriate to manage such risks within the safety case. Although the likelihood of occurrence or consequences is minor, it is appropriate to deal with them through normal workplace management. However, if the outcome of a hazardous event is significant and there is a likelihood of its occurrence, risk reduction measures should be taken to minimise the risk to be as low as reasonably practicable (ALARP). This principle requires that if a control is technically possible, reasonable and achievable without causing financial distress, then the control must be put in place.

The hazard model

Shell Aircraft set up and facilitated two workshop groups, one focusing on fixed-wing airline type services, and the other on offshore helicopter operations. The workshops involved pilots and engineers from a number of airlines

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and aircraft operators. Hazard management techniques learned in the workshops required that a hazard, once identified, is controlled to prevent the uncontrolled release of the hazard. For instance, an aircraft in flight is an example of a controlled hazard, in that it has the potential for harm through its inherent energy. If the aircraft is not maintained in a controlled state a hazardous event may occur, and therefore measures are required to prevent the situation from worsening. The intent is that crew action, in accordance with procedures and checklists, will restore operating equilibrium by using these measures. If these measures fail, the aircraft will likely suffer a consequence.

The initial task of the workshops was to identify hazards and list these as an entry point. Defining a hazard as "something with the potential to cause harm" enabled participants to identify hazards and confirm they had energy which could be released and cause harm. The process then continued, identifying potential flight and ground hazards, including locations. The presence of a hazard in different locations could warrant different controls or recovery measures.

The workshops moved on to identify primary hazards and, specifically, the hazardous events that resulted from first release of a hazard. Each event required the bow-tie analysis. Typical in such a complicated industry as aviation, this could have led to an unmanageable number of analysed events. The number of analyses was reduced through additional identification of hazards, which were prime sources of energy. For example, an aircraft could be affected by severe in-flight weather, which would require its own bow-tie. However, if the aircraft is seen as the prime hazard, then weather is only one of many threats that could disrupt flight. Conversely, a parked unattended aircraft has little or no potential to cause harm, but severe weather could damage the aircraft and, as such, would be the hazard.

Statement of fitness:

After a master list of hazardous events was established, each possibility was subjected to a brainstorming session. After the proactive side of the bow-tie was taken into account, it required only a simple process to add recovery measures. A typical example was when an unairworthy aircraft was released to service: there were 24 threats and associated controls, but recovery measures were limited to informing the flight crew with the intent of recalling the aircraft or dealing with the problem after landing.

In documenting development of a safety case structure, the workshops agreed that the safety case would need to cross-reference company manuals using signposting techniques. This significantly reduces the textual volume of a safety case. The other principle was to ensure that all controls identified to manage threats or escalation factors were embedded in operator or manufacturer processes, procedures and checklists. Within the safety case, the hazard analysis information produced in the bow-tie exercise is also processed into operator checklists.

The final safety case output was to produce the conclusion and statement of fitness (SOF). In the field this would be signed by the company's chief executive officer. The SOF is crucial in that it confirms fulfilment of commitments needed to implement a comprehensive and structured approach to safety management. Also, the SOF is a visual demonstration to staff, regulators and customers of how well objectives, as defined by the safety management system, are being met.

The work of identifying hazards and hazardous events has not resulted in any major breakthroughs in finding new hazards. However, it was ground-breaking to gain an understanding of all hazardous events and highlighted that much of what is needed to control hazards is already in place. The 85 per cent of controls already in place are not necessarily as robust as they should be. Additional controls can be listed as remedial actions that need management decisions about which to address, and when.

Safety improvements

Many of the improvements identified could be made without much effort or cost. Even so, some additional controls were identified that would have real costs. The prime findings of the process were that:

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- management reviews must be more active to ensure that intended improvements take place;
- safety competence and accountability are often ill-defined or missing in the organisation, in particular the ability to trace safety accountability from the CEO down;
- training in non-flying/technical areas was lacking, especially when staff are promoted to management with significant changes in skill and knowledge requirements;
- there was a significant amount of work being done with the best of intentions but without regard to procedural requirements;
- use of procedures, notably in engineering, was not systematic and often not assessed by supervision or audit;
- workplace monitoring and supervision practices were inadequate;
- processes to manage change were ineffectual;
- audit processes were frequently inadequate;
- human factors were not well addressed, with shortfalls in training and/or application of the principles; and
- incident investigation often addressed effect rather than cause and therefore denied the company the chance to learn.

The hazard modelling workshops were carried out over eight months in 1999 with pilots and engineers from eight airlines and five helicopter operators. These workshops produced two generic hazard models, one each for fixed- and rotary-wing application. Nineteen generic hazards were identified. Each of the hazardous events was discussed at length, and control methodologies defined. It became clear that the means of controlling a hazard varied, depending on whether the aircraft was in flight, undergoing maintenance or moving on the ground. In all, four fixed-wing and six rotary-wing locations were defined. To aid with generation of bow-tie models for each hazardous event, generic threat and threat control lists were assembled. These included descriptions for each threat and the source where the threat or control would be relevant. These generic models can be adopted for any aircraft operation. The generic hazard model is now being translated into the field by a number of operators who are customising it to specific operations.

Conclusion.

Development of a safety case involves significant effort by aircraft operators. However, projected growth in the number of accidents is unacceptable. Current efforts are somewhat piecemeal and are not reducing the accident rate. A positive, integrated approach with support structures is required to improve the situation. To make further progress will require changes in corporate culture, including management's approach to safety. Some would argue that the industry is over-regulated, but this viewpoint is insupportable when the costs of human life and corporate liability are taken into consideration.

Possible Pull Quotes:

A generic hazard register can be tailored to any operator, enabling a company's resources to be focused on the areas of greatest risk.

A safety culture exists when there is a willingness to learn from hazards and threats as well as from accidents and incidents.

Central to a safety case is the identification and management of hazards.

A hazard must be contained through procedural, organisational or physical controls — but these measures alone are not enough.

Hazard model workshops were carried out over eight months with current pilots and engineers from eight airlines and helicopter operators.

Cliff John Edwards
Quality Safety manager
Shell Aircraft Limited

Cliff Edwards served from 1961 in the Royal Air Force, then from 1973 in civil aviation as a Licensed Aircraft Engineer. Between 973 and 1989 he held several management positions including Aircraft Engineering Manager for Shell in Brunei. In 1984 he also became Deputy Head of Aircraft Services, which added to the management of maintenance, those of the airfield and flight operations.

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always, he came out with many "gems" of knowledge. He added an interesting addition to his famous Swiss cheese model with a mouse eating at the last block of cheese that is the companies "coping resources" to the error. He called the mouse nibbling "an accumulation of minor events" that have been ignored or unrecognized until an event occurs.

Don Sherritt, Director, Maintenance & Manufacturing, Transport Canada than gave a presentation of what the regulator is doing in Canada to promote a safety environment. He discussed in detail, the maintenance safety program that is now at the CARAC (Canadian Industry Advisory Committee) level. One rather new approach is the calling for an "Accountable Executive" for all approved maintenance organizations.

Captain Daniel Maurino Coordinator, Flight Safety and Human Factors Programmes, ICAO (International Civil Aviation Organization) presented a look at risk and deviation management. One of the things he called for were: "Think about the spirit rather than the letter of the law" and ended with "Stop the beatings - morale won't improve".

Ms. Angela Elgee Manager, Continuing Airworthiness Division, FAA, substituting for Nicholas Lacey, outlined what the FAA is doing to reduce maintenance errors. Many of her success stories came from the Human Factors Research program now run by **Ms. Jean Watson** Program Manger, Aviation Maintenance & Inspection Human Factors Research. Their website www.hfskyway.faa.gov has had over six million hits over the years and can be recommended to anyone interested in human factors for maintenance.

Jim Done Deputy Chief Surveyor of the UK Civil Aviation Authority discussed the changes occurring in the UK. One very interesting one discussed the work being done to remove the punitive aspect of unintentional human error. It is hoped that this will bring about a better reporting of all human errors.

Art LaFlamme Director General Civil Aviation, Transport Canada, outlined "Flight 2005, A Civil Aviation Safety Framework for Canada" The Target is to see airline accidents reduced by 40% over a five year average and commuter and air taxi by 50%. Details can be found on their website at www.tc.gc.ca/aviation.

In the afternoon, **Keith Jones** Vice President Maintenance, Air Nova with the assistance of Charles Dunstan and David Deveau provided insight into their "Journey towards Error Reduction Management" They expressed the belief that: "Diligent attention to human factors in error reduction go hand in hand with improved safety and improved financial performance".

Dr. Drew Dawson, Director Center for Applied Behavioral Research, University of South Australia provided an interesting and entertaining insight into fatigue. Part of his talk outlined a study they carried out that correlated the effects of fatigue and that of alcohol on one's judgment. He concluded by saying we are very concerned about drugs in the workplace but fatigue is four times more likely to cause impairment than drugs or alcohol.

Bill Ashworth, Vice President Maintenance, Quality & Engineering, BF Goodrich Aerospace, with the assistance of Tim Killion, Quality Liaison Airframe Services Division, discussed Safety Management emphasizing the safety assessment, data analysis and information feedback. Using MEDA (Maintenance Error Decision Aid) they were able to demonstrate their significant reduction in errors.

Ed Frederick Organization Effectiveness Coordinator provided a spellbinding recounting of the Three Mile Island near nuclear disaster. Like most accidents, it was a series of small errors that never seemed to stop. A lot of latent conditions lay in the thought that a series of little things would never occur until it did and they were overwhelmed by the mixed signals they got.

The first day finished with **Richard Desmarais** Safety Manager Air Canada recounting his companies approach to the issue of discipline. The "Dirty Dozen" are used as part

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of the human factors investigation into any incident/accident with the primary purpose to learn from and prevent a reoccurrence.

Day Two started off with **Dr. John Lauber** Vice President Safety & Technical Affairs, Airbus Industries of North America detailing the integration of safety management into corporate cultures. His definition of a safety culture was "You'll know it when you see it". Or perhaps more easily defined: "the integration of safety management principles".

Clifford Edwards Quality & Safety Development Manager, Shell Aircraft outlined an excellent model of managing human factors through safety management. An article by Cliff is in this issue and is well worth the reading.

John Gogola Board member of the National Transportation Safety Board gave an impassioned presentation of where we are and where we still have to go. One interesting fact he related was that of the last 14 major accidents in the USA, 7 have had a major maintenance component.

Dr. James Taylor Ph.D. with the able assistance of **Manoj S. Patankar** Ph.D. from Santa Clara University and San Jose University took us through the evolution of MRM (Maintenance Resource Management) and the role of communication in this evolution.

Dr. Jose Blanco Laurentian University presented a return on investment of safety management while with only a short time before lunch, **John Stelly Jr.** Managing Director Systems and Training, and Karin L. Poehlmann Senior Technical Analysis Maintenance Human Factors Engineering for Continental Airlines took us through a fast but very interesting model for investing in Human Factors Training: Assessing the Bottom Line. They used "Icarus Airways" and provided an excellent model for defining the true cost/benefit of training. Their Advise: Talk to finance first, not last. The remaining 1 ½ days were taken up with workshops. All the workshops were filled to capacity and I believe well received.

Workshop #1 was a one and one-half day workshop conducted by **Will Boles**, Regional Aviation Safety Officer – Maintenance Transport Canada and **Gordon Dupont** CEO System Safety Services. This workshop introduced the new Transport Canada human factors course that will be available to the public for a nominal cost.

Workshop #2 was repeated three times and covered the topic of Integrating Human Factors Programs into your Management of Safety. This workshop was mediated by **David Hall** of the UK CAA and had as speakers. **Chow Hock Lin** Senior Quality Engineer, Singapore Airlines Engineering Company, and **Josef Salik** Human Factors Steering Group Leader, Engineering & Maintenance, Qantas Airways Ltd.

Workshop #3 covered the introduction to the tools of safety management: Shift management and Fatigue by **Dr. Drew Dawson**, University of South Australia.

Workshop #4 facilitated by **Jim McMenemy**, Human Performance Specialist, System Safety covered: Introduction to the tools of safety management. Assessing safety within your organization through error reporting, data management and data analysis.

Panel members were: **Jerry Allen Jr.** Manager Human Factors Delta Airlines, **Commander John Schmidt** Medical Service Corps, United States Navy, **Captain Rene Dacie**r Flight Safety Officer Air Nova, **Maury Hill** Manager Macro Analysis, Transportation Safety Board of Canada and **Dr. Gary Eiff** Aviation Technology Program Purdue University.

This symposium saw the largest gathering ever of persons interested in human factors in aviation maintenance. It was a tremendous opportunity to mix and meet.

At the icebreaker reception **Gordon Dupont** and his wife B**irgitta** were recognized by the FAA with a plaque: "In recognition and appreciation of your dedication to Aviation Maintenance and Inspection Human Factors Initiatives March 1993 to August 1999".

Next year the 15th Symposium will be held in London UK March 2001: Plan to be there.

MARSS

Annual General Meeting

The AGM was held on March 29th.,2000 at the Vancouver Waterfront Hotel at 1900hrs. It was held with several members of MARSS present.

Bob Rorison, the president, mentioned the successes that the society had achieved in the previous year, including the completion of videos, and the advanced state of the latest "Ramp Safety' posters.

He also referred to the alteration in the role that MARSS had adopted, with the commencement of Canadian Airlines splendid course in HPIM training. In addition, Gordon Dupont, has now created a new company, System Safety , with the help of Bill Foyle, Johnny Rush, and Paul Jenkins.

- All three candidates were elected to office, the directors slate for 2000 being :-

E.J Braund - Executive Secretary
W. Foyle - Consultant
G. Dupont - Elected
P. Jenkins - Dept. of National Defense
L. O'Brien - Elected
S. Mikituk- Canadian Airlines International Ltd
R. Rorison - British Columbia Institute Of Technology
J. Rush - Elected
A. Schellekens- S.I.L Industries Ltd
R.Wisniewski – Elected

Thanks are extended to everyone for helping to make this a successful year, and helping form the new board.

FROM THE EDITOR!

Hello and welcome to the spring edition of GroundEffects! Spring is finally here! The feature article is an article written by the well famous Gisele Richardson of Richardson Management. It is an article that deals with the fact that everyone of us CAN change. Gisele simply points out that if someone truly wishes to change and learn then the odds are that they will change but if someone is determined that they cannot change then they most likely never will. I was taking the HPIM part one workshop for the first time and there was a man in our team who sat down accross from me and looked at me and said, "This is a waste of my time, there is nothing that these two fools can teach me, that I don't already know!" I simply smiled and thought to myself (this guy is an idiot that is going to be a big pain for the next two days). At the end of the second day, we were filling out the questionnaire about the course and he looked up at me and smiled and said, "Wow, I never knew that I could have so much fun and learn so much in two days." This time I thought, see it is possible to teach an old dog new tricks. Everyone has the ability to learn and start to do things differently perhaps more safely.

Our second article is an artilce written by Cliff J. Edwards. This article deals with the ways to develop the generic hazard model for use in safety cases. This is a great learning article. The behind the scences look at how models are made for us to use as learning tools. Take a minute and see how the process is evolved.

In this edition we also have a report of what happened at the 14th International FAA/CAA Transport Canada Human Factors in Aviation Maintenance Symposium. If you missed it, you do not want to miss this article.

On a more personal level, this is the last issue of GroundEffects that I will be publishing before I become Mrs. Paul Seabrook. So, please do not panic when you see the name of the GroundEffects editor has been changed. Please wish for lots of sun in Vancouver on May 27, 2000.

Take care and remember that every dog has the ability to change and learn new tricks and as I am sure that I will learn many new things in my new venture as a happy wife.

NOTE:

Transport Canada System Safety is holding it's HPIAM course June 28/29. Please contact Gerrry Binnema at (604) 666-9519 for further details.

GroundEffects

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