

The SPM (Surveillance Procedures Manual) and the MSM (Management System Model) – CASA's new Tools for Systems Audits

The aim of this article is to explain in greater detail CASA's new safety systems audit approach using the MSM as an analysis and evaluation tool. This article uses material from the cover stories in the September-October 2001 issue of Flight Safety Australia by Professors James Reason and Patrick Hudson, both of whom are recognised internationally as specialists on safety management systems, and Bruce Byron, who has significant practical experience in establishing such systems in an Australian context. It also uses material from the Safety Management Breakfast Briefings held around Australia from 10 -18 September 2001 by these three specialists.

The change from Prescriptive to Outcome-based Regulations and their impact on CASA's Surveillance

These are times of change in the aviation system in Australia. The old prescriptive Civil Aviation Regulations 1988 (regulations that mostly prescribed the precise steps to be taken, leaving little or no discretion for deviation) are being replaced by the new CASRs (Civil Aviation Safety Regulations). The CASRs emphasise the required outcomes, wherever possible, aiming to make the regulations less prescriptive and as outcome-based as possible. This approach allows a level of freedom to the authorisation holder (Civil Aviation Authorisation holder) to identify the means by which to achieve the outcomes by designing and implementing compliance assurance systems. Some CASRs will require the integration of all systems into SMS (Safety Management Systems). This, in turn, requires CASA to verify how well those systems are designed, implemented, and used. The use of the Management System Model (MSM) as a common standard for analysis and evaluation for all CASA audits is expected to provide consistency in such verification.

The benefits of introducing the MSM now: Firstly, those who choose to use the model to design and implement well-structured systems now would reap the rewards of a trial period before the CASRs come into effect. This trial period should provide the following benefits:

- CASA audits, in addition to an authorisation holder's own *Monitoring and Improvement* processes, could be used to:
 - Help debug the systems, including the monitoring and improvement processes.
 - Apply the MSM principles to achieve the appropriate balance between formal and informal processes and to integrate them (especially applicable to very small organisations).
- If done well, it should prove beneficial for transition to the new CASRs.

Secondly, it would provide CASA the opportunity to receive feedback and make any required improvements.

MSM - What is it

The MSM is a tool than can be used to analyse data in a structured way through various stages of a systems audit, namely, preparation, conduct, reporting and follow up. It also takes note of what the three specialists had to say on safety management. Reason referred to the three Cs - Commitment,

Cognisance, and Competence - as excellence drivers and the four Ps of management – Principles (Philosophy), Policies, Procedures, and Practices – as the application areas. He suggested that management ask themselves the following questions with respect to the three Cs:

- **Commitment:** In the face of ever-increasing production pressures, do you have the will to make your safety management tools work effectively?
- **Cognisance:** Do you understand the nature of the ‘safety war’ - particularly with regard to human and organisational factors?
- **Competence:** Are your safety management techniques, understood, appropriate, and properly utilised?

Reason illustrated the relationship of the three Cs with the four Ps as shown below:

3Cs x 4Ps = 9 sets of indicators			
	Commitment	Cognisance	Competence
Principles (Philosophy)	1	2	3
Policies	4	5	6
Procedures		7	8
Practices			9

Reason then went on to explain the relationship.

1. Principles and Commitment

- Safety is recognised as being everyone’s responsibility, not just that of the risk management team.
- Top management accepts occasional setbacks and nasty surprises as inevitable. It anticipates that staff will make errors and trains them to detect and recover them.
- Safety-related issues are considered at high-level meetings on a regular basis, not just after a bad event.

2. Principles and Cognisance

- Past events are thoroughly reviewed at high-level meetings and the lessons learned are implemented as global reforms rather than local repairs.
- After some mishap, the primary aim of top management is to identify the failed system defences and improve them, rather than seeking to pin blame on specific individuals at the ‘sharp end’.
- Understood that effective risk management depends critically on the collection, analysis, and dissemination of relevant information.

3. Principles and Competence

- Top management adopts a proactive stance towards safety:
 - Strives to seek out recurrent error
 - Eliminates error-provoking factors in system.
 - Brainstorms new scenarios of failure.
 - Conducts regular ‘health’ checks on organisational ‘vital signs’

- Top management recognises that error-provoking institutional factors are easier to manage and correct than fleeting psychological states.

4. Policies and Commitment

- Safety-related information has direct access to the top.
- Safety management is fast track not an oublie - and rewarded accordingly. (*Oubliette* is a “Secret dungeon with entrance only by trap door” – Concise Oxford Dictionary).
- Meetings relating to safety are attended by staff from a wide variety of departments and levels.
- Messengers will be rewarded not shot.

5. Policies and Cognisance

- Management recognises the necessity of combining reactive outcome data with proactive process information. The latter entails far more than occasional audits
- Organisation has policies in place that recognise the dependence of a safe culture upon the prior establishment of . . .
 - A reporting culture
 - A just culture.

6. Policies and Competence

- Reporting system policies:
 - Qualified indemnity against sanctions.
 - Confidentiality and/or de-identification.
 - Separation of data collection from disciplinary procedures.
- Disciplinary system policies:
 - Agreed distinction between acceptable & unacceptable behaviour.
 - Peers involved in disciplinary proceedings.

7. Procedures and Cognisance

- Procedures should identify error-prone steps in tasks.
- Procedures backed by training in the recognition and recovery of errors.
- An awareness that procedures cannot cover all circumstances.
- Special training for on-the-spot personnel.

8. Procedures and Competence

- Procedures to be:
 - Intelligible
 - Workable
 - Available, etc.
- Knowledge required to do a job should be shared between procedures, reminders & forcing functions.

9. Practices and Competence

- Rapid, useful, and intelligible feedback on lessons learned and actions needed.
- Bottom-up information listened to and acted upon.
- Visible top-level involvement: walking the talk & talking the walk.

The MSM – Its structure and how it addresses systems issues

The MSM consists of four Systems Attributes (the term ‘Attributes’ is used in further references to it), namely Management Responsibility, Infrastructure,

Process in Practice, and Monitoring and Improvement. The Attributes are made up of one or more Components, totalling twelve in all. Some of the Components are broken down into sub-components to facilitate greater evaluation. There will be references to safety and quality in the MSM. This is to highlight the need for an integrated approach to management. The following table shows the Attributes, Components and sub-components.

Attributes	Components	Sub-components
Management Responsibility	Management Commitment	Policy
		Responsibility and Authority
		Nominated Management Representative
	Planning	Objectives and Quality/Safety Planning
		Internal Communication and Consultation
		Hazard Identification and Risk management
	Management Review	
	Infrastructure	Facilities
		Tools, Equipment and Materials
		Data, Information and Records
		Personnel
Process in Practice	Process in Practice	
Monitoring and Improvement	Internal Audit	Remedial Action
	Internal Reporting	Corrective Action
	Investigation	Preventive Action
	Remedial, Corrective and Preventive Action	

Safety Management: WHO is responsible - WHAT is it, WHAT do you do to achieve improvements - WHEN is action appropriate – WHY do you need it - HOW do you know when improvements are taking hold

We are discussing CASA audits and the MSM. ‘WHO, WHAT, WHEN, WHY, and HOW’ are at the core of a systems audit philosophy. Hence, these five core audit questions are considered in explaining MSM’s contribution to the development and improvement of a system focused on safety/quality.

‘WHO’ is responsible for management to achieve safety: In ‘Practical Safety Management’ Bruce Byron says, “The Civil Aviation Act places the responsibility on senior management and directors of the company to exercise ‘due care and diligence’. What that means is senior management must take all reasonable steps to manage the safety of the operation: quite different to merely satisfying specific regulatory requirements. Since senior management is responsible for the organisation, it seems logical to involve them with both organisational managers and technical staff in a structured manner to collectively manage and control safety issues.”

James Reason has this to say in ‘In Search of Resilience’, “Safety management starts with a management philosophy that recognises there will always be threats to safety. It sets the organisation’s standards and confirms that safety is everyone’s responsibility. Safety management specifies how safety will be achieved, with clear statements of responsibility, authority, and accountability. It begins with the development of organisational processes and structures that incorporate safety into every aspect of the operation.” In ‘Safety culture: The ultimate goal’ Patrick Hudson says, “Management has to

be truly committed to the maintenance of an advanced culture in the face of success and/or failure.”

The MSM and the ‘WHO’: The MSM takes the view that senior management is responsible for establishing the various processes for organisational functioning and also those that help monitor and improve them. With this in view, ‘**Management Responsibility**’ looks at how committed the auditee management is to discharging their responsibility through the following ‘Components’.

- **Management Commitment:**

- **Policy:** Has senior management developed clear policies? Do the policies include a clear commitment to safety/quality and a commitment to legislative compliance? Have they established processes for the dissemination of the policies to all levels of the organisation?
- **Responsibility and Authority:** Have responsibility and authority for various functions and roles been appropriately defined and communicated within the organisation?
- **Nominated Management Representative:** Has a person (or a team of people with a person in charge, in the case of larger organisations) been appointed and given responsibility and authority to manage, monitor, evaluate, and coordinate the management system?

- **Planning**

This component is the key to whether all safety requirements (legislative and accepted practices) have been considered during the design and implementation of various processes.

- **Objectives and Safety/Quality Planning:** Has management established clear objectives for the various functional areas within the organisation? Are these objectives measurable and consistent with organisational policies? Have procedures been developed to help staff perform tasks that contribute to these objectives and achieve compliance with relevant legislation?
- **Internal Communication and Consultation:** Have appropriate processes been established to ensure that effective top to bottom and bottom to top communication and consultation takes place? The vital impact these processes have on the successful implementation and maintenance of ‘Monitoring and Improvement’, and specifically on ‘Internal Reporting’ cannot be overemphasised.
- **Hazard Identification and Risk Management:** Are there processes in place to identify hazards that have the potential of causing harm to personnel or equipment? Is there a process to assess the impact of these hazards in terms of likelihood and consequence and to minimise their impact?
- **Change Management:** The hazard identification and risk management processes should be used to ensure integrity of the system is maintained during periods of change. Change could include any of the following:
 - Changes or expansion to operations
 - Contingencies, like the absence of a position holder
 - Introduction of new aircraft or equipment

- *Introduction of new procedures*
- *Increased resource utilisation*
- *Induction of new staff*
- *Change in operating environment*
- *Change of key personnel*
- *Introduction of new routes*

- **Management Review**

Are procedures in place for regular reviews of the management system?

The inputs for such a review should include:

- *Results of internal/external audits*
- *Status of corrective and preventive actions*
- *Follow-up actions from previous audits*
- *Changes that could affect the management system*
- *Inputs from internal reporting systems*

The outputs of the review would be decisions made for the improvement of:

- *The ‘Monitoring and Improvement’ system as a whole*
- *The effectiveness of the management system and contributing processes*

‘WHAT’ is safety management

Bruce Byron has this to say, “History tells us that human activity is prone to error. Errors can occur in the development of policy and procedures by management, in the same way that errors occur on the flight deck or in the hangar. In short, errors by all participants in an organisation can contribute to that ‘less safe’ condition. A safety management system recognises the potential for these errors, and endeavours to establish robust defences to ensure that those errors do not result in incidents and accidents”.

Reason says of the ‘error problem’, “There are two ways of looking at the error problem. First is the person model, which is the dominant model. It is the view that in an accident, the initiating causes occur between the ears of some individual at the sharp end. However, it is also the case that the accident would not have occurred without some existing condition within the organisation. The purpose of an organisational safety system is therefore, to identify the condition that allows that individual to be exposed to a hazard, and to remove the condition, thereby removing the hazard.”

The MSM and the ‘WHAT’ and ‘WHEN’: Having considered whether management, have discharged their initial responsibility for safety under ‘Management Responsibility’ we can now look at how the ‘Infrastructure’, ‘Processes’, and ‘Monitoring & Improvement’ are set up to achieve safety goals, the **what**. We will then go on to see **what** needs to be done and **when** to ensure system integrity, through maintenance and continuous improvement. It also addresses some of the **why** issues.

‘Infrastructure’ consists of the following ‘Components’ and the various controls in place to continuously ensure their updating and suitability:

- **Facilities**
These include all buildings and workshop facilities required for the satisfactory performance of activities authorised.
- **Tools, Equipment and Materials**

Includes tools, hardware, software, materials, and equipment to perform authorised activities.

- **Data, Information and Records**

Data and information include documented policies and procedures, manufacturer's data etc, either in written or pictorial form. Records provide evidence of performance and/or completion of tasks.

- **Personnel**

Personnel should be qualified, trained, and competent to perform for the processes in support of authorised activities.

'Process in Practice' is the 'show me' part of a systems audit when performance of various tasks contributing to the processes is observed. It should verify whether:

- *The policies and procedures are adequate for the tasks being performed*
- *The process meets legislative requirements*
- *The process design and implementation is effective and is able to achieve its objectives*
- *Process interrelationships and interdependencies are identified and they work well.*

'Monitoring and Improvement' is the attribute that is at the heart of a safety/quality system. This focuses on finding problems within the system through internal audits, provides system feedback including latent conditions through internal reporting, finds causal factors through investigation and takes action to remedy the problems, eradicate the causes and remove latent conditions through remedial, corrective and preventive actions.

- **Internal Audits**

Should be carried out with planned regularity and should follow a process verification methodology and serve as a tool to uncover errors not only on the flight deck and the hangar but also those in the development of policy and procedures.

- **Internal Reporting**

This could be called the lifeblood of the system. Supported by a 'just culture' and established and nurtured by effective feedback, this could make the greatest contribution to developing and enhancing organisational culture.

- **Investigation**

Without a robust process to investigate and arrive at the root cause of problems highlighted, an organisation could not hope to be rid of the resident pathogens.

- **Remedial, Corrective and Preventive Actions**

Remedial action remedies the immediate situation, to bring the operation within safe parameters, so that the operation could continue.

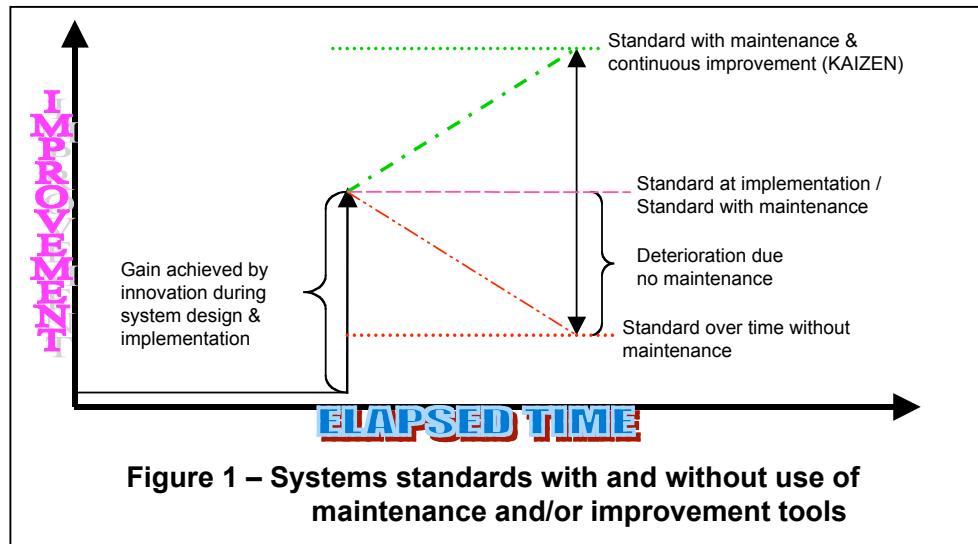
Corrective action aims to remove the root cause of the problem so that the problem does not recur.

Preventive action is more proactive in that it seeks to remove latent conditions before they produce a problem and achieve continuous process improvement.

System – Maintenance and Continuous Improvement

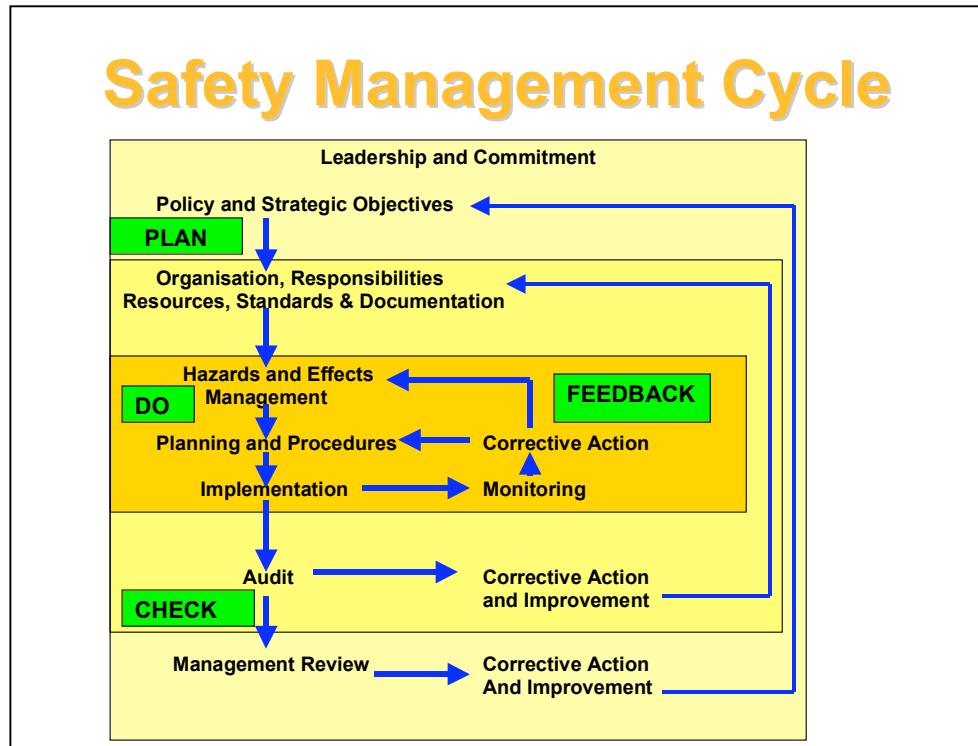
Systems are not dissimilar to buildings. They tend to deteriorate without regular maintenance, the same as buildings do. Design and implementation of systems are resource intensive, accompanied by much learning and

innovation. Innovation results in big gains. It should not be necessary, it is in fact wasteful, to go through such innovation, with the accompanying penalty in resources, to achieve system maintenance and improvements. The more efficient and cost-effective way is to nurture small incremental changes to effect maintenance and/or improvements, what in Japanese quality management is called KAIZEN. KAIZEN does not necessarily call for large investment to implement, but it does call for continuous effort and commitment. The figure below shows a system with and without maintenance, and with and without KAIZEN.



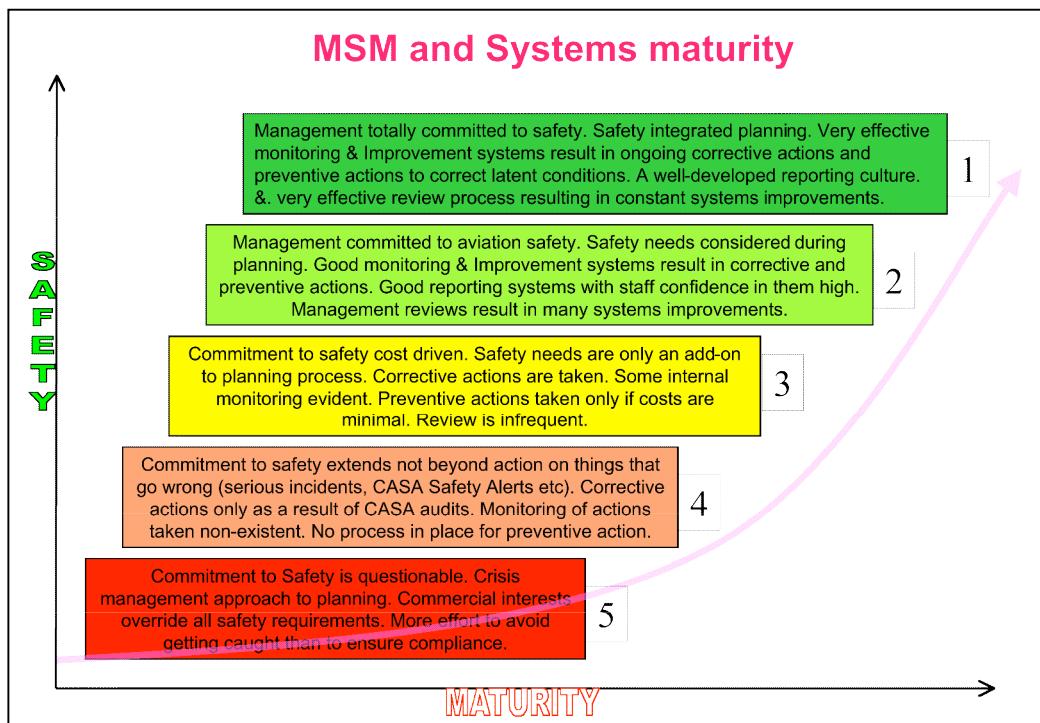
A tool for continuous improvement – The Safety Management Cycle

Patrick Hudson presented this tool called the safety management cycle.



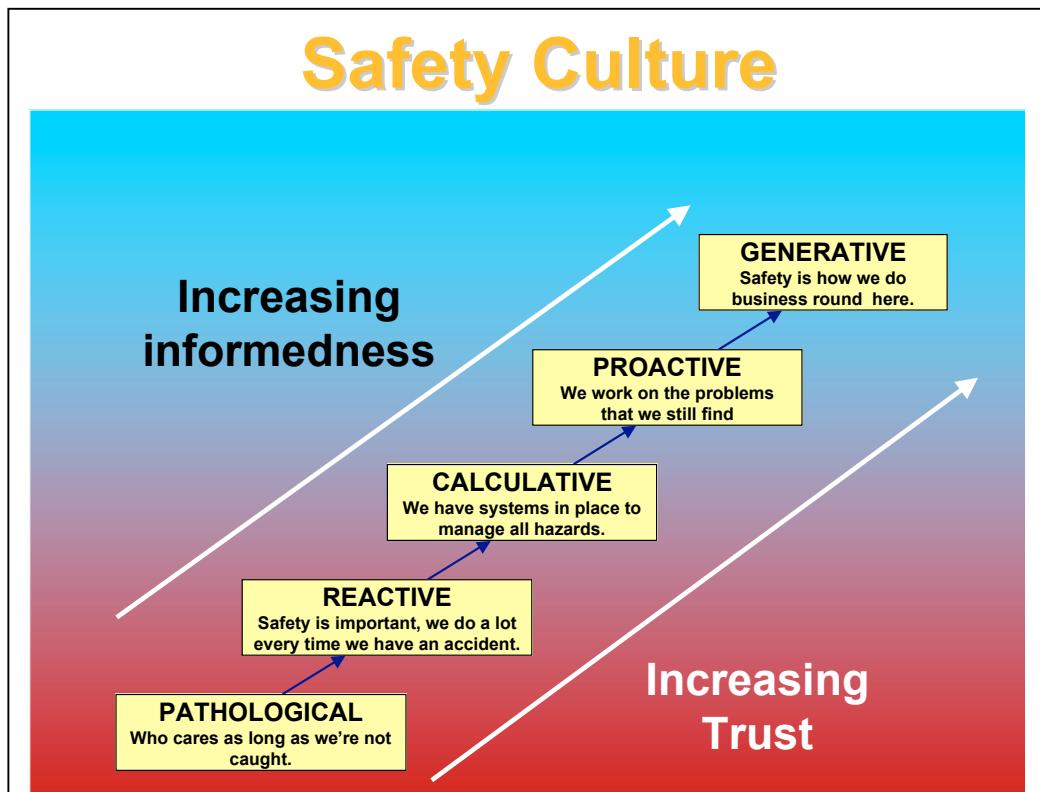
Use of the MSM to assess systems maturity

The MSM and its components could be used to gauge maturity of the system on an ongoing basis. Hence, an authorisation holder can use it to analyse and evaluate their own systems and the supporting processes.



The Evolution of Safety Culture

Professor Hudson depicted the evolution of safety culture in an organisation as shown below. This is what he had to say, "A safety culture can only be considered seriously in the later stages of this evolutionary line. Prior to that, up to and including the calculative stage, the term safety culture is best reserved to 'describe formal superficial structures' rather than an integral part of the overall culture, pervading how the organisation goes about its work."



'WHY' Safety Management

The best way to answer this question would be to use the following quote from Professor Hudson's article in Flight Safety Australia, September-October 2001 titled 'Safety Culture – The ultimate goal'.

"Safety management can make a big difference to any business. The benefits of a systematic approach to safety are obvious: the hazards of the business are known, understood, and controlled. However, the possession of a safety management system, no matter how thorough and systematic it may be, is not sufficient to guarantee sustained safety performance.

To proceed further it is necessary to develop organisational cultures that support higher processes such as 'thinking the unthinkable' and being intrinsically motivated to be safe, even when there seems to be no obvious reason to do this. What is needed is a safety culture that supports the management system and allows it to flourish.

The bad news is that creating a safety culture and keeping it alive requires effort. The good news is that less effort is required in smaller organisations, and safety culture is worthwhile, both in terms of lives and profits.

There is considerable evidence that the most safety-minded companies are also amongst the most profitable."

'HOW' do you know you have an effective safety system

The best way to find out would be to consider what Reason refers to as the hallmarks of an effective safety system:

- People feel encouraged to voice safety concerns and to report events resulting from human error without fear of retribution.
- When such concerns are reported they are analysed and appropriate action is taken.
- People are encouraged to develop and apply their own skills and knowledge to enhance organisational safety.
- There is never the complacent view that the safety system has achieved its goals and needs no further modification.
- Staff are regularly updated by management on safety issues.
- Management acknowledges all safety concerns and suggestions, and safety reports are fed back to staff so that everyone learns the lessons.
- Management practices what it preaches regarding safety, including the allocation of sufficient resources and the prioritisation of safety ahead of cost.
- Management gives timely, relevant and clear feedback on decisions, even if the decision is to do nothing.
- If no action is contemplated, that decision is explained.

When you can say 'yes' to all those hallmarks, you have in place an effective safety system.