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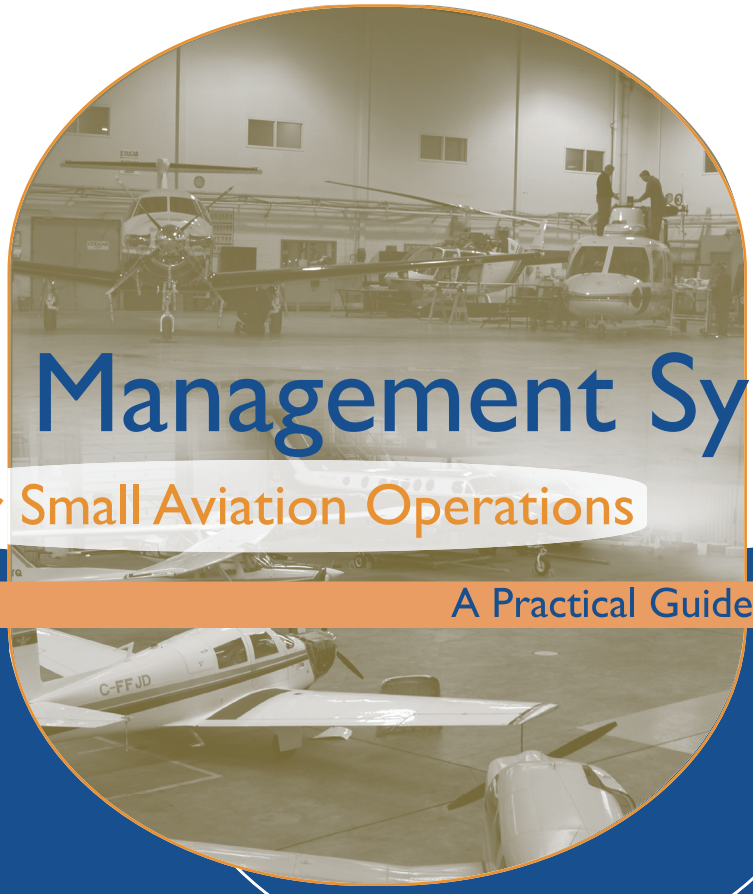

Safety Management Systems

for Small Aviation Operations

A Practical Guide to Implementation

TC-1001017

Canada

Other related TC Publications:

TP 13739	Introduction to Safety Management Systems
TP 13881	Safety Management Systems for Flight Opertations And Aircraft Maintenance Operations - A guide to implementation

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FOREWORD

In April 2001, Civil Aviation published a booklet *Introduction to Safety Management Systems* (TP 13739) as an introduction to the principles and concepts of a systems approach to safety management.

The purpose of that publication was to assist owners and managers who want to engage their entire staff in safety. It identified that implementing safety management systems (SMS) must be the cornerstone of a Transport Canada Civil Aviation plan to lower the accident rate in civil aviation as the industry continues to grow.

Introduction to Safety Management Systems explained how to promote a strong safety culture in an organization, the differences between safety management systems and traditional safety programs, and then identified the main features of a well-integrated system.

With the principles explained and understood, the clear challenge is to implement a sound safety management system in a practical manner, appropriate to the needs of each organization.

This booklet is designed to address the unique needs of small aviation organizations as they implement safety management systems. It attempts to make the jump from theory to practice and to offer guidance on successfully implementing SMS in aviation organizations holding certificates for air transport, aerial work, flight training, maintenance and special flight operations.

This is a practical guide. It acts as a companion volume to *Introduction to Safety Management Systems* (TP 13739) and the two booklets should be used together. The enclosed CD-ROM is an SMS Toolkit that contains sample documents that you can modify to suit your organization and your needs.

Merlin Preuss
Director General
Civil Aviation

September 2004

This document will be revised at intervals to take into account changes in regulations, feedback from industry and recognized best practice. Updates will be made available via the Transport Canada Civil Aviation Website.

http://www.tc.gc.ca/CivilAviation/SMS/menu.htm

INTRODUCTION

What is a Small Aviation Operation?

Before we talk about size, lets define what we mean by "aviation operations" for the purpose of this guidance book. The following types of organizations must hold a certificate to operate in Canada:

- Aerial Work (702)
- Air taxi (703)
- Commuter (704)
- Airline (705)
- Special Flight Operations (603)
- Approved Maintenance Organizations (500)
- Flight Training Units (406)
- Airports (302)
- Air navigation service providers (800)

In many cases a company will hold more than one certificate, the most common being aerial work/air taxi and maintenance or flight training and maintenance. There are a few companies that hold four or five different certificates.

There is no intended definition of what constitutes a "small" aviation operation. There are suggestions that a certain number of employees could be used or a specific number of aircraft involved but if the aircraft types are complex, a variety of types are operated, or there are a number of bases of operation, then the communications requirements may demand a more formal structure as seen in large operations. The same would be true for maintenance organizations and airport operations. The intent of this guide is to explain Safety Management Systems in the context of simple operations. Your organization may find the guidance applicable in some areas but may also choose to use other reference such as the *SMS for Flight Operations and Aircraft Maintenance Organizations* (TP 13881) for other elements of your system.

Regardless of the size or complexity, each of these types of organizations already recognize that risk exists in their operation and that they want to minimize if not eliminate the possibility of an accident or incident. None can afford the costs, financial or otherwise, of an accident. Indeed we all have heard the old saying "if you think safety is expensive, try an accident".

We know that individual accidents have repercussions on the entire aviation industry, not just on the individual operator involved. They affect how the public perceives our part of the industry, our commitment to safety and our expertise.

Each aviation organization *can* create a safe and informed culture that knows where the "edge" is without having to fall over it first. It can achieve this by implementing an effective safety management system.

Each of these types of organizations already recognize that risk exists in their operation and that they want to minimize if not eliminate the possibility of an accident or incident.

WHAT'S IN IT FOR YOU?

It's often said that safety makes economic sense. It is good for business.

It's often said that safety makes economic sense. It is good for business. Unless an operator experiences a loss, or critically assesses both the direct and indirect costs of an occurrence, it is often difficult to relate to this statement. The direct costs are usually easy to quantify - they include damage to the aircraft, compensation for injuries and damage to property and are usually settled through an insurance claim.

The indirect costs are a little more difficult to assess - these are often not covered or fully reimbursed by the company's insurance and the impact is often delayed. It is generally accepted in the insurance industry that unrecoverable costs can be 5 or 6 times the insurable claim and include such items as:

- Loss of business and reputation;
- Legal fees and damage claims;
- Medical costs not covered by workplace compensation;
- Cost of lost use of equipment (loss of income);
- Time lost by injured person(s) and cost of replacement workers;
- Increased insurance premiums;
- Aircraft recovery and clean-up;
- Fines.

The economic argument is even more compelling when one considers the direct cost of the following:

Claim	Insurable Portion of Claim		
	Flight Training Operation	Fixed Wing Air Taxi Operation	Helicopter Air Taxi
• Forced Landing (aircraft destroyed)	$150,000	$300,000	$900,000
• Damage to propeller (contact with object on ground) Overhaul propeller or rotor and engine teardown / sudden stoppage inspection	$20,000	$30,000	$150,000*
• Hangar Rash[1] (replacement of rudder or rotor blade)	$ 5,000	$10,000	$35,000
• Flight cancellation per day	$ 500-1,400	$3-5,000	$8-10,000

**These costs are mid-range estimates, actual costs will vary due to extent of damage*

As you can see, the cost of implementing and maintaining a safety management system becomes less significant and well worth the investment when contrasted with the cost of doing nothing.

[1]*Damage to the aircraft and equipment which occurs in or around a hangar.*

Part 2 of the Canada Labour Code creates obligations for employers regarding employee safety and health: all aviation operators must already comply with the provisions of the CLC. Sections 124 and 125 list the general and specific duties of the employer, which in general terms can be summarized as follows; employers must provide employees with

(a) a safe work place;
(b) health and safety training;
(c) personal protective equipment, clothing, devices or materials; and
(d) health and safety procedures.

While occupational health and safety (OSH) focuses primarily on safety of the individual employee, SMS focuses on organizational safety. The two are not mutually exclusive. A comprehensive safety management system may include and satisfy many of the Canada Labour Code requirements. For more information refer to the toolkit.

CHANGING THE SAFETY CULTURE

To understand how to affect change you must understand the evolution of the safety culture from past to present and how it needs to evolve in the future. Figure 1 illustrates this evolutionary process.

Traditionally, when something broke, it was fixed; if there was an accident, a change was made to prevent the accident from reoccurring. This reactive approach depended on a "command and control" style of management in order to achieve a safe environment. Lack of Standard Operating Procedures (SOPs) required close supervision to ensure safety. With the advent of company safety programs in the 1980s the aviation industry moved to a more team driven approach to safety. This approach continued to reduce the accident rate by creating safety awareness through programs such as Crew Resource Management (CRM) and Human Factors training. Documented SOPs allowed the training of consistent, repeatable procedures with the emphasis on individuals acting as a team. However, safety programs were still mostly re-active in nature.

The goal of a systems approach to safety is to further reduce the incident rate by making safety "behaviour driven". In other words, if everyone is trained to do their job in a safe manner and proactively look for hazards, then a company can improve their defences and build an organization more resistant to human error.

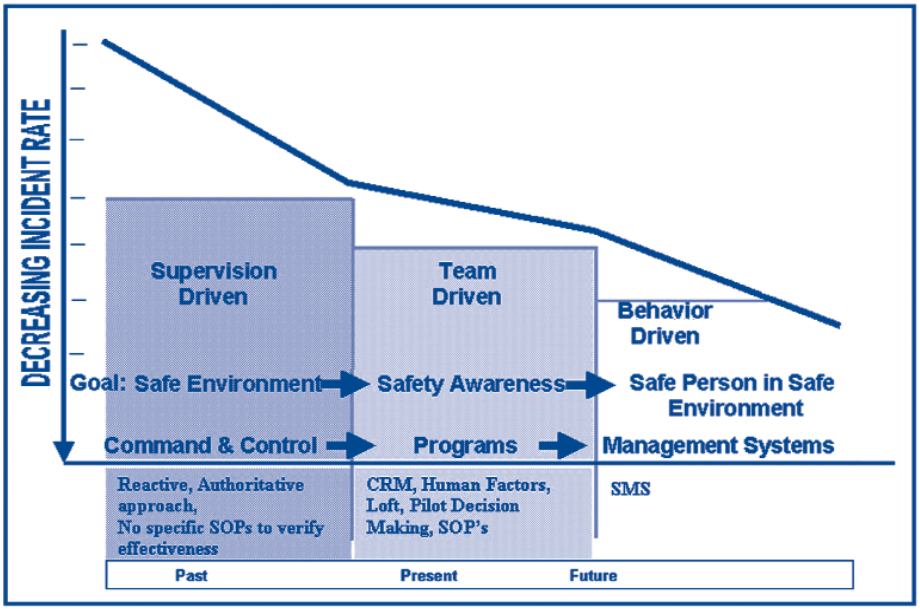


Figure 1: Evolution of the safety culture
(After Jacques Whitford, Safety Management Systems, 2002. Used with permission)

HOW A SAFETY MANAGEMENT SYSTEM WORKS

A system is a set of processes or components integrated to form a whole. Specifically, it is the interaction of these components or processes that create the system. A safety management system is a set of beliefs, practices and procedures for monitoring and improving safety in your organization. A system such as this requires a feedback loop. Referring back to Introduction to Safety Management Systems (TP 13739) Figure 2 (below) describes the basic safety process that is the heart of an SMS.

A safety concern, problem, hazard or occurrence is identified and reported (What's wrong?). It is then analyzed (How can we fix it?) and a corrective measure is implemented followed by an evaluation of its effectiveness (Did it work?). If the problem is resolved then it is documented. If it is not resolved it must be re-analyzed, possibly resulting in a different corrective measure followed by another evaluation. This is the basic safety process and is the foundation for any safety management system regardless of the size of your operation.

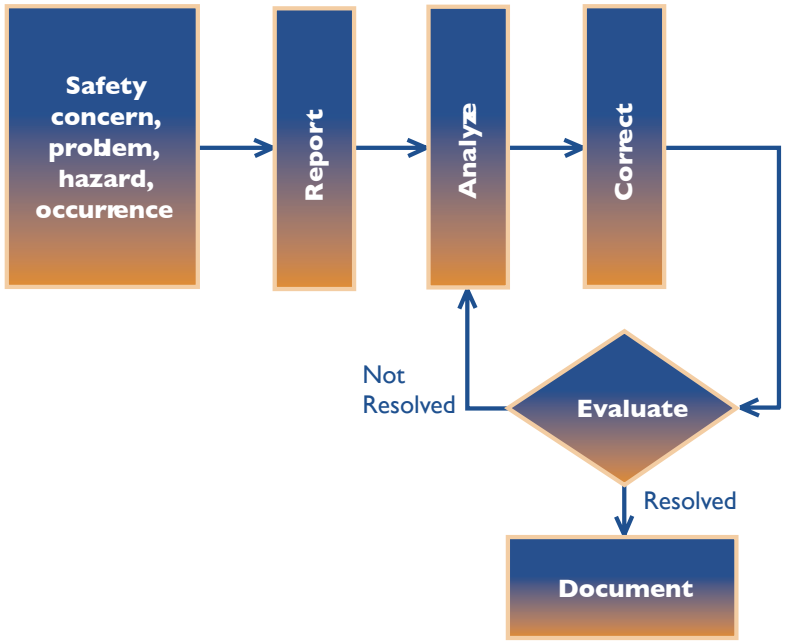


Figure 2 : The Basic Safety Process

Let us now see what SMS looks like in a small aviation operation.

LET'S BE PRACTICAL

To be effective, a safety management system must be tailored to suit the type of operation. A "one size fits all" approach will not work.

Not only do aviation organizations vary enormously in the type of operation conducted, they also vary from a one-person organization up to a large company with hundreds of employees and possibly several divisions or bases of operation. The geography, climate and economic environment in which the organization operates all influence its needs.

To be effective, a safety management system must be tailored to suit the type of operation. A "one size fits all" approach will *not* work. Certainly, it should not be any more complex than the rest of the organization's operation or management processes. The objective is to weave SMS into the fabric of the organization, to fully integrate SMS into its management methods.

This is not about telling anyone how to conduct their operation, but rather about following a small number of basic principles, and then adapting proven SMS components to fit the size, type and management style of the operation. As you read this document, you will likely find that 85% of the components and elements for SMS are already present in your organization.

COMPONENTS OF AN SMS

The following list is derived from Part 1 of the *Canadian Aviation Regulations* (CARs) for Safety Management Systems and describes the main elements required to build an SMS. You will have to refer to your specific part of the CARs, under which your organization is certified, for any elements that are unique to your type of operation[2].

(a) a safety policy;
(b) a process for planning and measuring safety performance;
(c) a process for identifying hazards and evaluating and managing risks;
(d) a process for ensuring that personnel are trained and competent to perform their duties;
(e) a process for proactive internal reporting and analysis of hazards, incidents and accidents, and for taking corrective measures to prevent their recurrence;
(f) documentation of all the safety management system processes, and a process for ensuring that personnel are aware of their responsibilities in regards to them;
(g) a process for conducting reviews or audits of the safety management system processes, on a periodic basis and for cause; and
(h) any additional safety management system requirements that are prescribed under the Part of the *Canadian Aviation Regulations* under which the operations certificate is issued;

When we speak of the components of an SMS, each component is necessary *in some way,* regardless of the size or type of operation. It is the extent or detail of the component that needs to be tailored to the operation.

For example, a training program in a one-person operation might be as simple as taking time once every few months, or even once a year, to read up on some aspect of safety management, for example, the experiences of another company in making its SMS work well. In a larger operation, it will require organized briefings of operator personnel. In both cases, because training is an essential component of SMS, the training will have to be documented.

When putting an SMS in place, it must be customized so that it suits your organization. It cannot be done by following a prescription. What is most important, in the final analysis, is that each component is effective, not just in place.

[2] *For example, Part 4,5, and 7 of the CAR's require Emergency Preparedness as part of an SMS.*

2 SAFETY MANAGEMENT PLAN

SENIOR MANAGEMENT COMMITMENT

Company management must be seen by their behaviour and actions to support SMS.

No safety management system will function effectively unless there is management buy-in and leadership. The Accountable Executive[3] of the operation must send a clear signal in writing to all its personnel, stating that this is the way it wants the operation to function.

No amount of enthusiasm or planning by staff will have any effect if management is lukewarm towards, or is seen to be unsupportive of SMS implementation. Staff need to know that they can count on company management to support their safety initiatives. Company management must be seen by their behaviour and actions to support SMS.

Here is a well-known safety poster that aptly illustrates this point.

In order for senior management to make a commitment and fully support safety management, they must have an understanding of risk management. This can be accomplished by self-education or by taking risk management courses. There are some examples of risk management processes included with the SMS toolkit.

Once hazards start to be identified, senior management must be prepared to commit resources to address those hazards. What types of resources are needed? Time is needed for meetings, information gathering and planning. Information is needed in the form of literature, seminars and training. You can determine which of your personnel already have expertise in safety management and involve them in the program to improve its viability. Finally, as hazards begin to be identified, senior management must be prepared to commit resources to find solutions promptly. If they are merely "swept under the carpet" because the fix is too time-consuming or costs money, the program will lose impetus and credibility, and the hazards will remain.

[3] *See section on "Responsibility"*

GAP ANALYSIS

Management commitment and a company policy are needed to get the "ball rolling". Once you have a good understanding of the required components for an SMS you can start to plan the development of your system. To start with, find out what components and elements you already have in place and identify the elements that are missing. This is called a Gap Analysis and is an excellent way to identify the areas you will need to address. It is also one of the requirements of the initial certification process for SMS with Transport Canada. You can use one of the self-assessment tools in the toolkit to help with this analysis. With a documented list of items that are required to meet the SMS regulations you can then plan how you intend to develop your own system.

The components and processes can then be put in place following the Transport Canada 3 year phase in approach described in the toolkit.

SAFETY POLICY

The written safety policy of management is a concrete expression of the management's philosophy and commitment to safety.

The written safety policy of management is a concrete expression of the management's philosophy and commitment to safety. "Philosophy" and "Policy" are the first two items expressed in the "4 P's" of safety management mentioned on page 2 of TP 13739. The safety policy does not have to be a lengthy volume. It should be a straightforward statement of the following points:

- Senior management commitment and intentions
- Establishment of safety as a core value
- Setting of safety objectives
- Responsibility for the safety program
- Non-Punitive Reporting policy

The Accountable Executive must sign it.

This can take many forms, but simpler is better. It could look like this:

- *To prevent accidents and to eliminate damage or injury, this company will maintain an active* safety management system. *I support the open sharing of information on all safety issues and encourage all employees to report significant safety hazards or concerns. I pledge that no disciplinary action will be taken against any employee for reporting a safety hazard or concern to this company's management. I pledge also that no staff member will be asked to compromise our safety standards to "get the job done".*
- *Safety is a corporate value of this company, and we believe in providing our employees and customers with a safe and healthy environment. All employees must comply with this policy.*
- *Our objective is the proactive management of identifiable risks and the elimination of injury to personnel and damage to equipment. To that end, we will continuously examine our operation for hazards and find ways to minimize them. We will report incidents, train staff on safety management, document our findings and our responses, and strive for continuous improvement.*
- *Ultimate responsibility for safety in the company rests with myself as the accountable executive. Responsibility for making our operations safer for everyone lies with each one of us – from managers to front-line employees. Each manager is responsible for implementing the safety management system in his or her area of responsibility, and will be held accountable to ensure that all reasonable steps are taken to prevent incidents and accidents.*

Non-Punitive or No Blame Reporting Policy

A policy describing under what circumstances an employee would be disciplined should be clearly laid out and communicated to all staff. Some operators communicate this policy to their staff by having it printed on the hazard reporting forms. In order to encourage a healthy reporting culture in a company there should really be only three reasons to discipline an employee. They are

1.Willful negligence

2. Criminal intent

3. Use of illicit substances

RESPONSIBILITY

Changes to Part 1 of the Canadian Aviation Regulations (CARs) will require a company to identify an Accountable Executive in any organization that holds an operations certificate. In smaller companies it is usually the owner or manager, but regardless of the organizational size, it is the person who "calls the shots" and controls the direction of the organization. Your Safety Policy puts ultimate responsibility for the effectiveness of the SMS in the hands of the Accountable Executive.

It is important that staff members who report hazards are seen as a positive influence on the organization. It must become praiseworthy to report if something is not working properly.

It is important that the role of each person be clearly defined. The responsibility for implementing and managing the components of an SMS in a specific part of a larger organization will generally be given to the manager or supervisor of that area, for example Operations Manager or Director of Flight Operations, Director of Maintenance, Person Responsible for Maintenance or Chief Flight Instructor etc. That person will in turn be held accountable to show that he or she has made a reasonable effort to implement SMS and to be prepared to respond to hazards and deficiencies identified by staff. In many small operations the owner is responsible for all aspects of the operation. In this case, SMS will be added to this list of responsibilities.

Do we need a safety officer?
Some aspects of the system, such as incident and hazard analysis, handling safety reports, information dissemination or developing training material may well be assigned to a designated safety officer, but it is vital that such a position not be allowed to become, or to be seen by others as being the sole person responsible for safety or for the safety management system. *It is everyone's concern.*

Every staff member has a responsibility to watch out for hazards, for the conditions conducive to human error or for procedures not tolerant of human error. All have a responsibility to report hazards and incidents so that steps can be taken to minimize or eliminate the hazard and so that others can learn from it and avoid the same situation. It is important that staff members who report hazards are seen as a positive influence on the organization. It must become praiseworthy to report if something is not working properly.

To see if you have clearly established the roles and responsibilities of each person in the SMS, ask yourself "who is responsible" and "what are they responsible for".

POLICY MANUAL

Although this section is titled Policy Manual it is important to note that organizations that already maintain control manuals may embed this SMS policy documentation within their existing manuals.

We should mention here the difference between a Safety Policy and a Safety Policy Manual.

In the section on "Safety Policy", we outlined a simple policy statement to be signed by the Accountable Executive. It is the commitment, the corporate philosophy and the policy direction for the company. No safety management system will work without it, because an unambiguous publicized "buy-in" from management is critical for success.

You can then expand on this and work out the details in a Safety Policy Manual. The extent of this will vary from a couple of pages in a very small company to several pages in a larger aviation organization. It would detail the methods by which the company will:

- Set specific goals for safety improvement
- Assign responsibilities to individual functional managers
- Ensure compliance with regulations
- Train its staff in safety management
- Provide and share safety information
- Review its operation regularly to identify hazards
- Eliminate or minimize hazards
- Document its procedures in managing safety
- Evaluate, periodically, the effectiveness of its SMS

These documentation requirements are discussed further in the section on "Documentation".

It is important to note that organizations that already maintain control manuals may embed this SMS policy documentation within their existing manuals.

SAFETY PERFORMANCE GOALS

Your safety policy includes an overall statement of your safety objectives. Examples of these objectives, which are broad in nature, are listed below. Now you need to describe specific safety performance goals. First of all, try to select goals that are attainable. One of the items on the periodic company safety assessment and management review (discussed in the section "How do we know we are being effective?") is that you will measure how well you achieved your goals. Here are some safety management system goals to help you start a brainstorming session in your company. Pick out the ones that best apply to your company. Select specific percentages and times where needed and add other goals that address your specific needs:

Safety Objectives

- To identify and eliminate hazardous conditions
- To provide safety-related educational material to all personnel
- To provide a safe, healthy work environment for all personnel
- To prevent and reduce aircraft accidents and incidents and to prevent resulting losses
- To incorporate awareness, compliance, inspection, investigation and education by providing programs delivered to employees
- To prevent damage and injury to non-company property and personnel resulting from our operations

Safety Goals

- To increase the number of hazard reports received by X % over the previous year[4]
- To investigate all hazardous events within X number of days of the occurrence
- To reduce days lost to injury by X % over the previous year
- To assist in developing Standard Operating Procedures (SOPs), where applicable
- To review, with safety in mind, all proposed new equipment acquisitions, facilities, operations and procedures
- To improve the effectiveness of the safety management system through a yearly safety assessment that reviews all aspects of the SMS
- To reduce annual insurance costs by X % over the previous year

[4]In a developing SMS with a new reporting system, you would expect to see an increase in the number of reports over the short term. This shows that the company culture encourages this feedback. In the long term, as the SMS matures, you would expect to see a decrease in number of hazard reports in a proactive company.

Management Review

Part of the development of a Safety Management Plan is ensuring that you can measure how well the plan is working. For that reason your goals must be measurable and have a time component. In the same manner that a manager's performance is measured against financial performance goals, success should also be measured against safety goals. In the section "How do we know we are being effective?" we will be talking about the "Management Review" which will rely on the safety goals that you set.

...your goals must be measurable and have a time component.

3 SAFETY OVERSIGHT

HAZARD IDENTIFICATION AND RISK MANAGEMENT

To make your operation safer, you need to know what could cause injury or damage, how likely it is to happen, and how serious the result could be.

To make your operation safer, you need to know what could cause injury or damage, how likely it is to happen, and how serious the result could be. The official terminology is "hazard identification" and "risk management". Let's start with some definitions.

A hazard is a condition with the potential of causing loss or injury.

A risk is the chance of a loss or injury, measured in terms of severity and probability.

For example, a wind of 15 knots blowing directly across the runway could be a hazard to a light aircraft operation. The risk associated with this hazard is that a pilot may not be able to control the aircraft during take-off or landing, resulting in an accident. You could probably think of several consequences of encountering this hazard, ranging from damage to equipment and reputation to injury and death. Another example of a hazard is an icy ramp. The risks include people slipping and falling, manoeuvring aircraft or vehicles not being able to stop, and possible FOD[5] if the ice is broken and loose. In a maintenance operation, an oxygen bottle stored near an oil cabinet or out of date maintenance manuals would be classified as hazards.

Your goal is to proactively identify the hazards in your operation, determine what risks are associated with these hazards and what the level of risk is for each scenario (We talk more about the risk assessment in the next section). Then you try to apply rules or design operating procedures that will reduce or eliminate the risks. This is known as a Corrective Action Plan. In rare cases you may decide that the risk is too great and that the best choice is to avoid the hazard by not engaging in a particular activity.

While we often think of hazards as being technical in nature, those that lead to accidents can be business-oriented - training, planning, budgeting, procedures and so forth. Here are some of the most hazardous times for an operation:

- When major changes are made to the organization
- Times of rapid growth
- When there is significant staff changeover
- When many employees are inexperienced
- When new procedures are introduced
- If financial problems start affecting operational decisions

[5] *Foreign Object Damage*

Although you look for hazards constantly, you should especially look for them at high-risk times such as these listed above, and you might even plan a safety self-assessment if these conditions exist.

This is the proactive part of safety management. You are looking for problems before they become incidents or accidents. OSH statistics suggest that for every serious or disabling injury in an organization there are upward of 600 previous safety deficiencies and minor incidents that may or may not have been reported. In an aviation context this can mean that, at an organizational and industry level, an increasing number of incidents will increase the likelihood of an accident occurring.

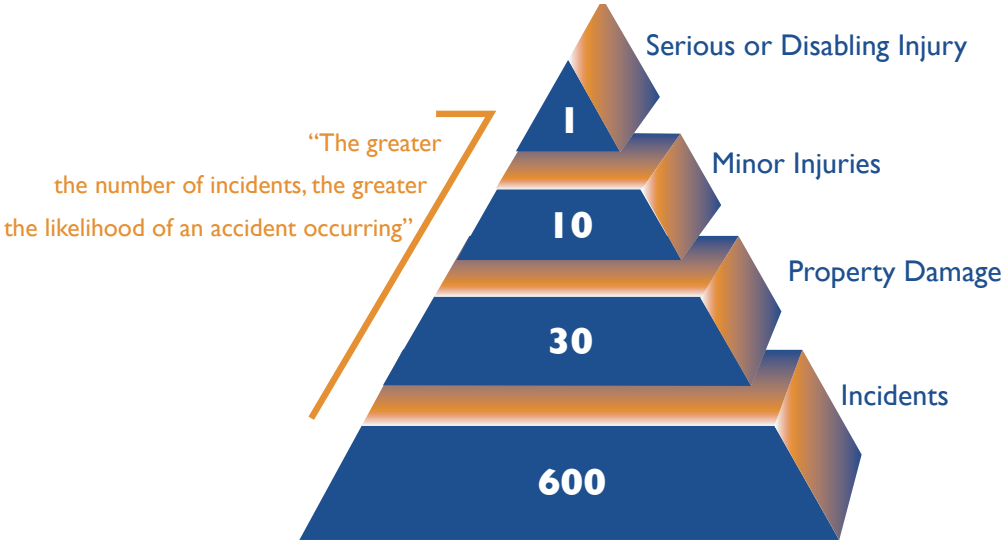


Figure 3: Accident Ratio Pyramid – Frank Bird

If you can find ways to reduce the number of incidents at the bottom of the pyramid, you will reduce the number of accidents. Remember that many of those 600 incidents cost you money. "Hangar rash" incidents are one example and can be actively reduced by finding the underlying factors of the problem and changing the conditions under which people work to reduce the likelihood of them reoccurring. The savings to you can be significant.

RISK MANAGEMENT - IT'S ALL ABOUT PRIORITIES

This risk assessment process must be practical and simple, and must match the size and complexity of the operation.

Once hazards and the risks associated with them are identified, you need to estimate the level of risk. You need to look at the likelihood (probability) and the seriousness (severity) of a potential occurrence. While some need much effort to correct, not all will require that level of resources and sometimes it is just not clear which hazards need the most attention. This is where risk analysis comes in.

This risk assessment process must be practical, simple and must match the size and complexity of your operation. In discussing the hazards, experienced staff can draw on their own experience, on safety publications, Transportation Safety Board (TSB) and other databases, on research they have done, and on other information about accidents over the years.

The measurement scales below are merely suggestions - it doesn't matter whether you use three, four or more descriptions to help you make an estimate, and you can word them in whatever way makes most sense to your work. First, for each risk identified, assess probability:

Probability

H-High	*It will likely happen*
M-Medium	*It has a fairly good chance of happening*
L-Low	*It is possible, but not too likely*
VL-Very low	*It will almost certainly not occur*

Secondly, again for each risk, for the moment assume that the incident DID occur. Now estimate how severe the consequences would be:

Severity

H-High	*Serious or irreparable harm to people or to the company*
M-Medium	*It would have a significant impact on people or property*
L-Low	*It might cause inconvenience but no real harm*

So where does that take us? You now know how to establish priorities and where to place most resources. Any risks rated at a HH level, in other words a risk that will PROBABLY happen AND would cause SEVERE or irreparable harm if it did so, obviously needs immediate and effective attention. A reported risk rated LL, on the other hand, which is not too likely and would cause no real harm if it did occur, would probably be placed pretty low on the priority list. You could plan to address all risks with a rating equal to, or higher than a MM.

In considering the hazards that you judge as serious, clearly you want to eliminate them. However, that may be impossible, so at least you want to reduce either their likelihood or their seriousness to the point where you can live with the remaining risk. Following that approach, you work out a strategy and take action. The solutions may include, among other things:

- A change in operating procedures
- A review of why the activity is necessary
- Setting up recurrent training
- Improving supervision
- Providing safety information or advice aimed at specific areas
- Doing some contingency planning
- Limiting exposure to the hazard

Here is an example of a risk assessment for a flight school using the measurement scale above.

Classifying the hazard into one of four categories (Natural, Operational, Technical, or Human) can also help in defining the risk scenarios. The 15 knot cross wind example given in the previous section could be classified as a natural hazard. In this case you can't control the hazard itself but you can eliminate or reduce the risk by listing all the options available to you and selecting and implementing the most appropriate option(s) for the level of risk you are prepared to accept.

Hazard – 15 Knot Crosswind on Take-off or Landing Natural	**Risk–** aircraft damage, financial loss, higher operating costs, loss of reputation, injury, death	**Risk Rating** MH
Options—to reduce or eliminate the risk	**Selected options**	**Revised Risk Rating**
• Stop all flying • Change runway to reduce x-wind component • Restrict aircraft types to operations that can handle this wind • Restrict inexperienced pilots • Provide extra training to pilots and students	• Change runways to reduce the x-wind component • Limit operations to experienced licensed pilots (No student solo) • Define different limits for various factors o Runway width o A/C type o Gusty/smooth wind conditions o Pilot Experience	LH

In considering the hazards that you judge as serious, clearly you want to eliminate them. However, that may be impossible, so at least you want to reduce either their likelihood or their seriousness to the point where you can live with the remaining risk.

Other options beyond control of flight school	
• Open previously closed runway more in line with wind. • Allow intersecting runway operations at a controlled airport enabling small aircraft to use more suitable runway	*These options are outside the control of the flight school but indicate that other solutions may exist that require the input of other stakeholders. Communication between airport operators, air navigation service providers and the flight school may increase the options available but would require these other groups to conduct risk assessments as well.*

The risk reduction strategies that you identify and are available to you may not include the effect caused by other stakeholders. In the example above, the airport operator may have another runway that has been closed for a variety of reasons but may be usable on a part time basis. At controlled airports, the availability of certain runways is based on air traffic control procedures at that airport and there may be options for modifying those procedures to accommodate your particular needs. In the case of a helicopter flight school, the policy may be to limit solo operations to a maximum gust spread of 10 knots to reduce controllability problems.

This process of identifying the hazard, determining the risks and developing options for reducing the risk is the *Hazard Identification and Risk Assessment* process. You will need to document this process and the resulting operating procedures.

We spoke earlier about giving feedback on action taken. This is now the point where you will want to provide feedback to the individual who reported, if they have chosen to identify themselves, and to the entire staff.

The final step you take is to follow up over time to see if your approach has worked, and to modify your solution as necessary in light of its degree of effectiveness. This closes the Continuous Improvement Loop and is part of the quality assurance process described in the section on "Quality Assurance".

Refer to the toolkit to help design a process that works for you.

INVESTIGATING ACCIDENTS AND INCIDENTS

Major accidents, especially if fatalities occur, are investigated by official agencies outside our own aviation organizations, and section 6 of the Transportation Safety Board Regulations obliges us to report them:

> *" ... where a reportable aviation accident or incident takes place, the owner, operator, pilot-in-command, any crew member of the aircraft ... having direct knowledge of the accident or incident shall report to the Board as much of the information listed ... as is available, as soon as possible and by the quickest means available."*

The AIP, in Section GEN 3.2, defines each term:

- Reportable Aviation Accident - serious injury or death, structural damage requiring major repair, aircraft missing, reportable OSH occurrences
- Reportable Aviation Incident[6] - engine failure or shutdown, gearbox malfunction, smoke or fire, control difficulties arising from external or internal causes, runway edge departure, gear up landing, wing tip damage, physical incapacitation, emergency descent, fuel shortage, incorrect or contaminated fuel, collision, risk of collision or loss of separation, declaration of emergency, dangerous goods released

In addition, however, you need to look into *every* incident or accident that occurs in our own operation so that you can learn from them and determine what hazards gave rise to them.

...you need to look into every incident or accident that occurs in our own operation so that you can learn from them and determine what hazards gave rise to them.

When reporting incidents and accidents, there are certain fairly obvious key pieces of information that you need about the event, and that you can build into a reporting form:

- Type, model and registration of the aircraft
- Name of the pilot-in-command
- Date and time of the occurrence
- Environmental conditions (weather, runway, etc.)
- Points of departure and of intended landing, including dates and times
- Location of the occurrence
- Number of crew members, passengers and other persons who were killed or sustained a serious injury
- Description of the occurrence and the extent of any resulting damage to the aircraft, the environment and other property
- Description of any dangerous goods on board or released from the aircraft
- Name and address of the person making the report.

[6] *Means an incident resulting directly from the operation of an airplane having a maximum certificated takeoff weight greater than 5, 700 kg or from the operation of a rotorcraft having a maximum certificated takeoff weight greater than 2250 kg.*

An internal investigation has two elements, the first is to gather all the facts and the second is to analyze the facts. In the case of a small operator it will most likely be the owner or senior management who will take this responsibility. Whomever you choose to do the investigation will need some basic training on how to do the job and how to prepare the report.

There is one caution: you already know that people make mistakes, so you do not need an investigation either to find that out or to assign blame.

There is one caution: you already know that people make mistakes, so you do not need an investigation either to find that out or to assign blame. In fact, not only are circumstances usually the cause of the human error in the first place, but also circumstances are more easily corrected than the average human being!

For example, an air taxi training pilot and line pilot undergoing training landed gear-up in a light twin while practicing touch and go landings. This was the third time this type of accident had happened at the operation in the last ten years. Each time the blame was placed on the training pilot, who was disciplined. Blaming the individual did not solve the problem. After the last accident an internal investigation looked at the conditions that allowed this accident to happen and discovered that conducting touch and go landings on their 3,000 ft. long runway, with this aircraft, was a hazard. The corrective action applied by this company was to restrict touch and go landings to runways in excess of 5,000 ft.

In another case, an apprentice engineer installed the landing gear pins in the main landing gear so the nose gear could be jacked and swung. When the gear switch was selected up, the main and nose gear retracted. The main jacks (which had been lowered but not removed) punched through the bottom of the wings as the aircraft came to rest on its belly on the hangar floor. An internal investigation found that the landing gear pins were installed in the wrong hole. While it would be easy to blame the apprentice, further investigation determined that the manufacturer of the aircraft had issued a service bulletin recommending that these holes be filled. It was never complied with. The incident took place at 3:00 AM in a poorly lit hangar and the aircraft was to be on line at 6:00 AM. The apprentice had never been shown the correct location for the pins. The corrective action applied by this company was to plug the holes as recommended by the service bulletin and ensure that training for new employees was developed and provided. Organizational issues were identified resulting in new lighting installed in the hanger and a redesigned process for ensuring all service bulletins were reviewed for each type of aircraft.

The clear goal of an investigation is to identify the hazards or underlying factors (the why) that led to this occurrence, and to see which of these factors in your organization's operation still exist and should be changed to prevent a reoccurrence.

Organizations are usually familiar with this reactive process. You will also want to look at the short and long-term effects on the company of the occurrence - they may be profound and will need to be identified.

While you don't need to be a trained investigator you do need some understanding of the accident or event investigation process. There are a number of tools available some specifically designed for investigating maintenance related errors such as MEDA/PEAT[7] but these may be more useful in larger maintenance organizations. For small operations, one the simplest tools is called "The 5 Whys". By asking why something occurred four or five times you get to a sufficient level of understanding of the underlying organizational factors that may have contributed to the event. The toolkit contains these investigative tools.

Many Root Cause Analysis tools originated in production environments and refer to a single causal factor being responsible for an accident. In an aviation setting, dealing with human factors, there may be a number of factors that interact to cause an accident or incident. These are called causal and contributing factors. In "The 5 Whys" example provided in the toolkit you will notice that after you have asked why for the second time there are three different answers given, each of which need to be followed with another "Why" question.

[7]Maintenance Error Decision Aid/Procedural Event Analysis Tool. See TP13881 SMS for flight operations and aircraft maintence organizations.

DATA GATHERING – THE SMALL STUFF

Major events such as accidents and significant incidents draw attention in themselves, and certainly will not go unnoticed.

However, it is a number of small risks or hazards which, occurring together, cause the series of failures that can lead to an accident.

However, it is a number of small risks or hazards which, occurring together, cause the series of failures that can lead to an accident. Figure 4 shows how these hazards or latent conditions that exist at the organizational level can contribute to an accident by allowing conditions to exist that make the unsafe acts or active failures possible and dangerous.

The question is, "How do you identify these small risks that often go unreported or even unnoticed?"

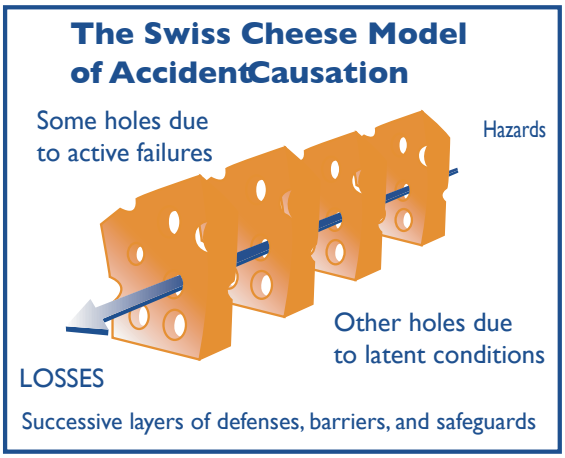


Figure 4: The Swiss Cheese Model - *James Reason*

You need an effective data-gathering process, but most particularly you need a reporting culture within the organization, one in which people are actively looking for current and potential problems. The reporting, then, looks at two things - events that DID occur, and events that MIGHT occur. Gathering data on both is equally important.

A large helicopter operator in the US started a program where employees received a prize for identifying a hazard or developing a safety related idea that was used in the company. In this case, employees were motivated to look for, and report hazards. The program was so successful that the accident rate for this company fell to zero during the life of this program.

The secret to long-term success is to develop a simple reporting system appropriate to the size of the company to encourage the free flow of safety information. This reflects three commitments already made by management in the company Safety Policy, namely that:

- Management supports the open sharing of information on all safety issues
- It encourages all employees to report significant safety hazards or concerns
- It has pledged that no disciplinary action will be taken against any employee for reporting a safety hazard, concern or incident

Successful reporting programs have these four qualities:

- Reports are easy to make
- No disciplinary action is taken as a result of submitted reports
- Reports can be submitted in confidence and are de-identified
- Feedback to everyone is rapid, accessible and informative

The reporting system has to have methods for doing four things:

- Reporting hazards, events or safety concerns
- Collecting and storing the data
- Analyzing reports
- Distributing the information gleaned from the analysis

There are various options for gathering the data - here are some:

- Confidential report forms deposited in a secure box
- Suggestion box
- Online computer reporting systems
- Confidential staff questionnaires
- An "open-door" policy for informal communication
- Brainstorming sessions
- Organized study of work practices
- Internal or external company safety assessment
- Simple forms to be included with regular documentation submitted by crews in the field

In very small operations reports can be verbal but it is essential that the end result be in written format rather than verbal, to preclude any reports "slipping through the cracks". Make sure that everyone knows exactly where, how and to whom to submit reports.

Management must make an extra effort to win the trust of employees when the level of anonymity is limited.

Sample reporting forms are included in the accompanying toolkit. The simpler it is, the less time-consuming it will be to complete, and the more people will be encouraged to use it. Keep a supply of blank report forms beside the collection box, with aircraft spares packages, or with crew position reports, but also accept simple hand-written notes. After all, this is about looking for safety hazards and fixing them, not creating a bureaucracy.

Should it *require* the individual's name? No. The person reporting *may* add their name, which allows the company to advise promptly that the report has been received and what corrective action is planned, but anonymous reports must be allowed. In a small operation, the level of anonymity will probably be limited, but it then becomes all the more essential that everyone understands the company Safety Policy's guarantee of no reprisals. Management must make an extra effort to win the trust of employees when the level of anonymity is limited.

You will almost certainly get better response if you post some ideas about the sort of issues to report. In general you are looking for hazards, risks, incidents and concerns - anything that has the potential to cause injury or damage. A system-wide application of this process will also include reports on recommendations to improve overall efficiency. Here are some examples you can suggest to get people thinking:

- Incorrect or inadequate procedures, a setup for error
- Poor communication between different parts of the company
- Out of date manuals
- Inadequate training
- Inadequate, incorrect or missing checklists
- Excessively long working days
- Missing or unsecured equipment
- Obstacles and limited clearances for manoeuvering
- Refueling hazards
- Flight preparation
- Unreasonable customer expectations or unplanned requirements
- Near misses or almost "gotcha's"

For more ideas, check out the section on "Quality Assurance" below on self-assessment. Encourage your company employees to brainstorm ways in which the system could fail, and to submit these ideas for review and correction. You might consider periodic informal staff discussions focusing on safety improvement, and then document the results. Larger operations may hold monthly safety meetings to review reports and encourage discussion on various safety issues. These meetings should be documented and any action required clearly recorded and followed up.

Whether you are a large or a small operator, you need to keep track of the data in these reports. You want to be able to monitor and analyze trends. Whether your safety database is in written or in electronic form, when you receive a report, categorize the type of hazard it identifies, the date and any other pertinent facts, what gets done to correct the problem and confirm that feedback was provided to all employees. Ensure that the data does not identify the reporter and then destroy the original report to protect confidentiality.

Follow-up is vital, both to correct safety problems and to show people that the program works. There are three parts to this:

- Decide who should be involved in ensuring prompt and effective corrective action
- Publicize what has been done to address *every* concern raised, including decisions to accept certain risks and why
- Alert people to the safety issues involved so that everyone can learn from them

Here are some ways to pass on company actions on safety issues to the staff:

- Bulletin board
- Company safety newsletter
- Company web site
- Email to staff
- Staff meetings

Finally, keep in mind that trust is the most important part of the reporting system, because people are being encouraged to describe, not only the hazards they see, but also the mistakes they themselves have committed. Getting feedback on safety weaknesses in the operation has proven to be far more important than assigning blame. For this reason it is important to have a non-punitive or no blame policy for reporting safety concerns.

WHAT TO DO WITH ALL THIS DATA?

With data coming in from incident and hazard reports, the next challenge is to work out exactly what the hazards are, and which ones are real threats to safety. After verifying that you have all the information required, you need to apply the hazard identification and risk assessment process.

Someone must be given the clear responsibility of analyzing the incoming information from your now-successful safety reporting system.

Someone must be given the clear responsibility of analyzing the incoming information from your now-successful safety reporting system. Some organizations may choose to appoint a safety officer to be responsible for this task but whether it is the owner of the operation or an employee the responsibility must be clearly expressed. For incidents, the person needs to be able to look beyond the events themselves and to ask what organizational or environmental conditions led to an error. As mentioned earlier, one simple way of analyzing an event is to use the "The 5 Whys" to determine the causal and underlying factors. This and other incident analysis tools can be found in the toolkit. For reported hazards, the person must identify in what way it could combine with human error to cause an incident.

Therefore, an organized method is needed to find the contributing organizational and human factors for each occurrence or reported hazard and then to categorize them. Here are some of the categories of organizational failure that can create conditions intolerant of error:

- *Organization*
    - Differing personal, group and organizational *goals*
    - Poor organizational *planning* for investment, personnel, responsibilities or equipment
    - Poor *communications* systems, transmission or interpretation of messages
    - Perceived organizational *culture* that may indicate a priority for profitability over safety
- *Operation*
    - Unclear *design* or operation of safety equipment
    - Quality, availability and accessibility of *equipment*
    - Availability, usefulness and understanding of *procedures*
    - *Training* insufficient or poorly designed and delivered

In many cases very small operators will not generate enough data to allow any statistically significant trend analysis. In these cases you will need to look at the industry as a whole to help identify possible trends. Reviews of accident reports, articles in trade magazines, and discussions with industry groups, participation in industry associations and other operators can provide useful data. In one case, several companies operating the same or similar equipment have been sharing information through e-mail that has allowed them all to benefit from identified deficiencies and hazards without each having to experience an event.

4 TRAINING

SMS TRAINING

Training, therefore, in how you have chosen to operate becomes important in helping to ensure that your goals are indeed achieved.

Of course you need properly trained personnel to ensure the quality and safety of the operations in your organization. Clear expectations, explicit work instructions, such as maintenance work instructions and standard operating procedures (SOPs) serve two purposes. It lets employees know what is expected of them and it allows management to expect consistency in the conduct of operations and to compare what is expected against actual performance. If a deficiency is identified or an event occurs, one of the pieces of the investigation will be to review the quality and the safety of the work instructions or SOPs and the adequacy of the training provided. Your existing training program will need to incorporate the components related to SMS.

As you develop your Safety Management System, you are adapting it to suit the size, management style and needs of your company. That means that no two systems will look exactly alike. Training, therefore, in how you have chosen to operate, becomes important in helping to ensure that your goals are indeed achieved.

- Existing employees will need detailed briefings on your SMS, on your management commitment to it and on their part in making it work.
- New employees will need to be familiarized with how your SMS operates, and in many cases you will probably find that you have to train them on the basic concepts of SMS as well.
- All employees will need periodic refresher briefings or discussion to make sure that everyone fully remembers what you are trying to do and how it needs to become and remain a part of the organization's lifeblood.
- In flight training operations, although student pilots are not employees, they should be aware of your safety management system and be trained in how to report safety deficiencies and hazards in the same manner that they now understand and report aircraft airworthiness problems. If they are commercial pilot students, they will be required to have a basic understanding of SMS principles as part of their licensing requirements.
- In some cases, external stakeholders will need to be aware of your SMS processes so that they can provide you with appropriate documentation and follow-up, when necessary.

Whether you are involved in flight or maintenance operations, to make the SMS work you need to take time to train and, yes, also to document that you did so. You will need to measure whether the person understands the training received, or to what extent existing employees have the understanding you hope they have.

What can you include in any of the above types of training? Here are some examples - pick those that will benefit your specific operation, and then add others that are unique to your type of activity. While many of these training topics are items that require procedural training remember that in the SMS context you are focusing on safety related issues as part of an integrated management plan.

- SMS principles including the Continuous Improvement Loop.
- Details of your company SMS including
    - Company Safety Policy
    - SMS Policy Manual (Documentation)
    - Roles and Responsibilities
    - Safety Reporting System
    - Analysis of accidents/incidents
    - Emergency Response Plan
    - Special Procedures
    - Non-Punitive Reporting Policy
    - Emergency equipment review
    - Applicable Canadian Aviation Regulation (CARs) review
    - Operations Manual review including company specific procedures such as Operations Specifications for special authorities like low visibility operations.

In addition to the obvious benefits gained from training, it is an indication to the employee that management thinks this is important enough to devote dedicated time to it and it shows to others (customers, insurers, regulators) that you have taken carefully planned steps to make safety consciousness a fully integrated part of the operation.

Who will provide this training? For some of these topics, you will probably have some staff members who have the expertise necessary to provide the training to others. For other topics, you may have access to outside consulting resources. Feel free to call on your local Transport Canada System Safety offices especially for briefings on Safety Management System principles.

5 EMERGENCY PREPAREDNESS

HANDLING AN EMERGENCY

Handled well, an accident response plan can help everyone cope with a highly stressful event. Handled poorly, an accident can destroy the reputation of an organization.

Even the most safety-conscious aviation organization can have an accident. An effective SMS can greatly reduce the likelihood, but can never entirely eliminate human error. It is a wise organization that, through emergency preparedness, has a plan on how to cope with an accident without waiting for one to occur. Commercial operations must provide, at a minimum, accident and incident reporting procedures and procedures for reporting overdue aircraft. Airports are already required to comply with extensive Emergency Preparedness[8] regulations outside the SMS regulatory requirements. Handled well, an accident response plan can help everyone cope with a highly stressful event. Handled poorly, an accident can destroy the reputation of an organization.

There is little that is complicated about an accident response plan. It really is just a matter of thinking in advance about the steps to follow and organizing them on paper. It does not have to be lengthy or involved. Here is the typical content:

- Whom to notify initially
- Care of survivors
- Emergency call list
- Notification of next of kin
- Public relations handling
- Record keeping
- Accident scene protection / investigation
- Personnel briefings
- Useful forms for on-duty personnel

The response plan must be useful to those who might be on duty at the time, must contain key data and guidance and everyone must know where copies are located. It would be useful to include a few minutes of discussion of the response plan in the recurrent training program for staff. Large operations carry out simulated emergency exercises as part of staff training to ensure the plan works (coordination with various agencies and stakeholders) and to provide everyone with a chance to practice their roles in a controlled situation. Even small operations can benefit from a practice run of their plan.

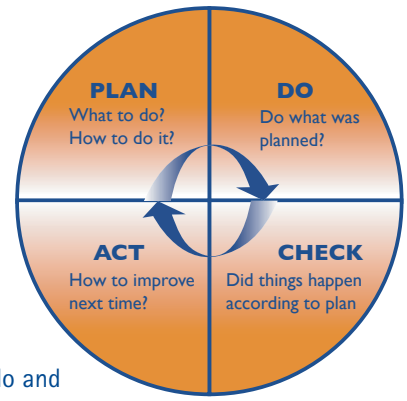
A response plan may have different components for different personnel depending on the size of an organization. Front line staff must have clear simple instructions and procedures to follow in the immediate aftermath of an accident but components of a plan for the management or for the person assigned the task of dealing with the media will include more detailed information for dealing with emergency authorities, insurance companies, media and next of kin.

The toolkit includes sample response plans.

[8] *If you are an aircraft operator based at a certified airport ask to see the airport ER plan and compare the components to your plan.*

QUALITY ASSURANCE – OPERATIONAL AND SYSTEM REVIEWS

Quality Assurance (QA) is required by regulation for some certificate holders and is an integral part of SMS. There are actually two different levels of quality assurance you need to consider. The first is operational QA, which verifies that all activities are conducted in accordance with regulatory and company requirements, typically reflected in the appropriate control manual (MCM/MPM for maintenance, and COM for flight operations). The second is system QA, or system review, which evaluates the overall effectiveness of the company SMS and the interaction of the individual processes within the company.



As a basic principle, most management system models follow a Plan, Do, Check, and Act (PDCA) Cycle of Continuous Improvement. All of the individual processes in a company are planned (PLAN), performed as planned (DO), reviewed for effectiveness (CHECK), and modified as necessary (ACT) to ensure that they are safe, effective and efficient.

All staff needs to know what they are supposed to do and how they are supposed to do it. This can only be achieved through effective communication (training, SOPs, work instructions, etc.) between the planners and the doers. The principle of Checking is to see what really happens on the job. Are company procedures adequate?Do all staff understand the procedures? Are the procedures being adhered to? If it is found that the actual practice is different than the instructions then you have two options. You can make sure staff follow the instructions or you can change the instructions to make them more suitable for the required task. Both options require some more planning and implementation, thus continuing the cycle. This Continuous Improvement Loop process should be used for assessing every activity within a company including: operations, maintenance, training, finance and administration.

In very small organizations where the planners and the doers are the same people or are working closely together, the main method of communication will probably be verbal. In this case, the Checking is occurring on a daily basis. Remember the key is to keep it simple and appropriate for the size of the organization.

One way to ensure internal coordination is through the use of control manuals. Most operators and maintenance organizations ensure policy and procedures are carried out properly by providing written guidance in the form of standard operating procedures, rules of conduct or maintenance instructions. These are usually placed in an Operations Manual or Maintenance Policy Manual. The policies and procedures relating to safety management

All staff needs to know what they are supposed to do and how they are supposed to do it. This can only be achieved through effective communication.

systems would typically be expressed as a component of these manuals but may be contained in a separate SMS manual if the company prefers.

At the system level, the PDCA continuous improvement cycle operates due to the commitment expressed by the management through the SMS policy. It focuses on the SMS processes such as the hazard identification and risk assessment, reporting, training and documentation. This ensures that the system is operating the way it is supposed to and if it is not, what changes (Plan) need to be made and implemented (Do) in order to correct the deficiency.

SMS requires all of the individual processes within an organization to have effective communications linkages so that the safety ramifications of processes in one area are clearly understood within all of the other areas in the company. So part of the system assessment is to see how effective the communication would be between different areas. For example, in a larger operation: Are a pilot's concerns about his or her lack of currency on a particular aircraft (due to scheduling issues) being considered by the dispatch and shared with the training department and the Chief Pilot? Again, in the case of very small organizations this is very easy to evaluate, as the person responsible for the different processes will usually by the same person.

Self-Assessment

Whether you call it a self-assessment, review or audit, the process is essentially the same. But remember that the operational audit and the systems audit are looking at different things. This process could be completed by a group or by an individual who is already familiar with your workplace and its procedures. The number of people involved will depend on the size and complexity of your organization. Some of the best observations will come from those who are performing the procedures and, by making the employees a large part of this process, they are also kept informed and involved. This is an area where the non-punitive reporting processes within a company are essential to the success of this review.

How often should you do this? Again, it will depend on several factors such as the size, complexity and type of operation but realistically, given the planning and time it requires, once or twice a year should work well provided it is done thoroughly. There may be prescribed frequency of review periods in the CARs. In the section on "Hazard Identification and Risk Management", we mentioned certain events during which the risk of mistakes is higher or where additional oversight is needed and so if these events occur, an additional self-assessment would be warranted.

The self-assessment should be planned so as to cover the entire workplace. In a small operation, this will likely take several hours, while for a larger operation the assessment could be conducted in different areas of the workplace on different days. An effective assessment will review all parts of the operation to identify strengths, weaknesses and areas of risk and will follow a carefully prepared checklist. This assessment may be done in small components over a period of time to reduce the effect on operations.

An effective assessment will review all parts of the operation to identify strengths, weaknesses and areas of risk, and will follow a carefully prepared checklist.

In analyzing procedures, the person or persons conducting the assessment will need to be very aware that people may do a specific procedure; in the way they were trained, or in the way they thought it should be done or even just in "the way it's always been done". The objective is to take a critical look at every part of the operation. Actual work practices will be compared with ideal, safe working procedures and at every point in the checklist you need to ask "in what way could human error make this item a link in an accident chain?"

Your checklists will have to be tailored to your operation's size and environment and should be updated regularly. As a guide, Transport Canada audit checklists can be obtained from the TC website or from your principal inspector. Sample checklists for the SMS assessment can be found in the toolkit. You can use or modify these to build one relevant to your organization. A comments section will allow documentation of weaknesses and areas of risk, as well as of items not specifically included in the checklist.

In a very small organization, the assessment could be included as part of an annual or end of season company meeting. This may take the form of a review of the activities of the previous year to highlight both positive and negative aspects of company performance. A list of activities or jobs that the company has performed could be presented and problem areas that occurred would be discussed with the staff as a group and changes to procedures would be developed to prevent re-occurrence. In this way, the lessons learned from these cases could easily be shared and distributed throughout the company. This would provide an opportunity to close the continuous improvement loop by reviewing planned actions and making appropriate changes to procedures.

In order to satisfy the requirement for documentation in this area, a record of this meeting including the planned agenda and resulting actions should be kept in company records.

As with routine hazard identification, an effective self-assessment has accurate and complete documentation. A written report summarizing the results is recommended and should be provided to the Accountable Executive. This will provide the information needed for a management review.

As with routine hazard identification, an effective self-assessment has accurate and complete documentation.

Good documentation makes the results accessible to everyone in the organization and eventually will allow the results of several audits to be compared to provide trend analysis.

The section on "Risk Management" discussed using risk analysis to set priorities for corrective action, and the importance of giving everyone feedback on the hazards identified as well as on the steps being taken to minimize or eliminate them. Exactly the same process is used for the follow-up to a self-assessment.

Above all, this assessment, by being in-depth and all-inclusive, is a golden opportunity to find and fix safety weaknesses which otherwise might be overlooked. Make it work for you.

HOW DO YOU KNOW YOU ARE BEING EFFECTIVE?

Management Review

The person responsible for the safety management system (Accountable Executive) has to be confident that the system is working and that it is effective. If done correctly, the self-assessment or internal audit will show whether or not the system works, provided there is adequate documentation. It is a review of the achievement of the specific safety goals you have set, the success of the corrective action plans and the risk reduction strategies implemented that will show whether or not your system is effective. This review will include whether or not the safety objectives in the SMS policy and the safety performance goals need to be revised. This is part of the continuous improvement loop for the entire system. This is also part of the 4th "P". Practices.

No SMS is perfect, so you will want to ensure that the operation of your SMS continues to evolve and improve. Sometimes corrective actions or risk reduction strategies create other problems. The management review should ensure that these problems are being addressed by the system.

Make sure that you include your staff in your appraisal of the system. If the number of reports starts to drop off it may not be due to a safer operation - instead there may be other reasons. In fact you might expect to see an increasing number of reports in the first few years of the operation of your SMS that could indicate your reporting culture is developing; staff are comfortable making the reports and they are more proactive in looking for hazards.

Remember that it is a never-ending struggle to identify and eliminate or control hazards. You will never run out of things to do to make your operation safer.

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7 DOCUMENTATION

DOCUMENTATION

We have already stated that SMS is about looking for safety hazards and fixing them, not creating a bureaucracy. However, as we have discussed throughout this guide, keeping track of your system requires certain elements to be documented so that you can ensure everyone knows what to do and to determine the effectiveness of your safety system.

...keeping track of your system requires certain elements to be documented so that you can ensure everyone knows what to do and to determine the effectiveness of your safety system.

There are two types of documentation. One is a description of the policies, processes and procedures that you intend to follow to operate your SMS. The second is the records or outputs from these processes. For example, you will write down how your reporting process will work and place this in your policy document (control manual). Any company specific procedures such as how to file a report would reside in the procedures section of a control manual and the reports that are generated by this process will be gathered, analyzed and stored as records. You should have a policy on how these records are stored (paper or electronic files) and how long they are kept for.

Here is a summary of the areas you will need to address when planning the documentation for your system.

Safety Management Plan

- Written Safety Policy
- Safety Objectives
- Safety Performance Goals
- Statements of authority, responsibility, and accountability for safety

Safety Oversight

- A description of the processes for:
  - o Reporting hazards, safety concerns, accidents and incidents
  - o Evaluating and classifying risk
  - o Event Investigation and Analysis
  - o Corrective Action Plan

Documentation

- Description of how changes to the regulations are incorporated into company operations
- Documenting risk control strategies and monitoring the effectiveness
- Documenting safety meetings
- Recording details of reviews and corrective actions

Training

- Outline of your SMS training program and staff training records

Quality Assurance

- Description of the process for
  - o Conducting and documenting internal audits/reviews of operations
  - o Conducting internal system reviews
  - o Communicating the results of reviews to senior management
  - o Implementation of corrective actions

Emergency Response Preparedness

- Description of the responsibilities and actions required in the event of an accident

Where you choose to place this SMS policy and process information will depend on the types of control manuals you are currently required to maintain under regulation. Depending under which Part of the Canadian Aviation Regulations you are operating, you could place the SMS related information in one or more of the following locations.

- Part 3 Airport Operations Manual
- Part 4 FTU Operations Manual[9]
- Part 5 Maintenance Procedures Manual
- Part 6 Special Flight Operations Manual
- Part 7 Company Operations Manual

Multiple operator certificate holders may chose to maintain a separate SMS Policy Manual and place SMS procedures specific to each certificate in the corresponding control manual. In this case, the policy manual should provide references to the individual control manuals to help direct staff to specific procedures. Operations that currently do not require an approved control manual would also maintain a separate manual for SMS policy and could include procedures as well.

[9]Flight Training Units are only required to maintain an operations manual with authority to deliver integrated courses. In the case of other FTUs a separate SMS policy manual would be appropriate.

CONCLUSION

It is not only

good business sense;

a good SMS will

save you money.

A safety management system can benefit your operation regardless of its size. In the same way a successful business uses financial management systems to manage its operations, successful aviation operators treat safety like any other business process. It is not only good business sense; a good SMS will save you money.

Use the CD toolkit to help you build your system. It contains ideas and useful files for each component as well as the SMS evaluation tool that will be used by Transport Canada to assess SMS.

The key foundation needed to build an effective system is the commitment of the owner or top management to provide support in the form of resources and to foster a culture that is open, willing and able to share information. Good communication and well-trained employees will increase the chances that your system will work.