

實施安全管理系統，建構優質成功事業

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什麼是安全管理系統?

若要為安全管理系統(Safety Management System, SMS)下個簡單的定義，那就是:有組織的管理安全問題，從而預防失事事件的發生。SMS本質上屬於主動式(proactive)而非反應式(reactive)作為，其目的在於事故發生前管理與安全有關的風險(risk)與危害(hazard)，以避免事故發生。

本文探討如何在航空事業體內推動安全管理業務及其所需元素與流程，以建構一個成功而有效的安全管理系統。實施安全管理系統能讓事業體得益甚多，其中有些效益甚至超越了法規符合與保障安全等傳統面向。

ICAO對SMS的定義：

“SMS 是一種藉由有效管理安全風險來保障航空器作業安全的系統,該系統透過危害識別、資料收集與分析及安全風險評估等作業以持續改善安全狀態。SMS 尋求在事故發生前以主動方式消弭問題,並與該組織的法規符合與安全目標相稱。”

簡介

依據國際民航組織的安全管理手冊，SMS實施架構包括4個要項與其相應要素，並應符合下列規定:

1.安全政策與目標

- a. 管理階層的承諾與責任
- b. 安全責任
- c. 任命關鍵安全人員
- d. 協調緊急應變計畫

e. 安全管理系統文件

2. 安全風險管理

- a. 辨識危害因子
- b. 安全風險評估與緩解措施

3. 安全保證

- a. 安全績效之監測與評估
- b. 改變管理
- c. 持續改進之安全管理系統

4. 安全提升

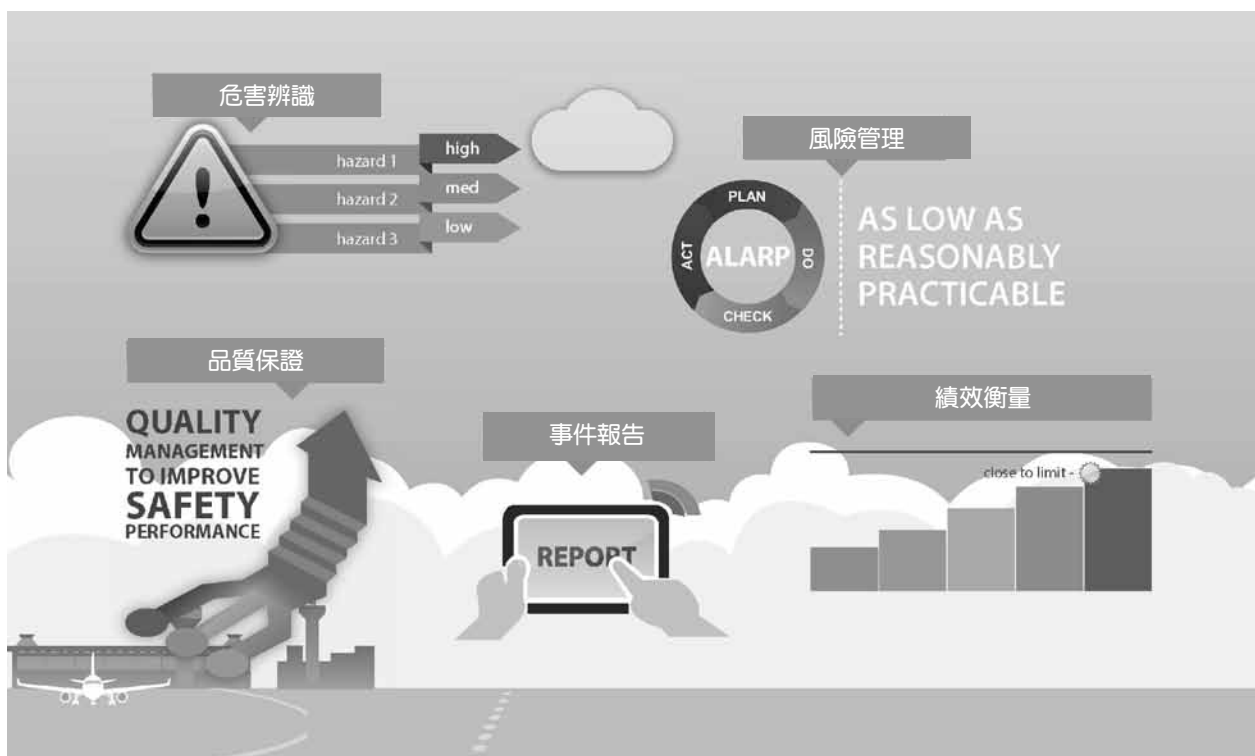
- a. 教育訓練
- b. 安全交流

值得注意的是:無論組織的規模如何，這些要項與要素都應完整呈現於安全管理系統中，惟其執行程度與細節可依系統複雜程度而酌予增減。

組織文化在一個有效的SMS中扮演重要角色，其有效性取決於來自資深管理者與所有員工的承諾。為了達成此有效性，應在組織內構建一套完全開放的交流模式，以便持續改善過程的實施。此種交流應能超越組織內部並延伸至整體環境，得以與其他業者分享意外事件的經驗學習。

安全管理系統的關鍵流程

在ICAO安全管理手冊中所勾劃的SMS要項與要素，仍須藉由某些關鍵流程方能建構而成，它們包括:



危害辨識

SMS作為一種主動性質的工作，如何從最前端辨識可能造成失事的危害自然成為首要流程。多種來源可協助進行危害因子的辨識，舉其大端者有：

- 報告系統
- 內部調查
- 趨勢分析
- 飛航資料分析
- 日常作業監控
- 與其他業者的飛安資料交換



維持並鼓勵一個能在事件發生前有效運作的報告系統，以保證辨識系統能適時發揮預警功能。

事件報告

一個運作順暢而能識別潛在安全危害的正式報告系統是達成SMS的基本要求。基於SMS的主動性質，事件報告可以讓所有員工報告他們所見所聞，並因為事件調查而能展開失事預防各項作為。這也意味著事件報告系統不僅限於事件詳細過程的描述，也應包含對相關問題的掌握與瞭解。



只有在事件報告被進行詳細分析並進而導致工作程序的改善後，事件報告的效益才得以彰顯。分析與改善工作同時能激勵組織中的學習與分享意願。

詳細分析與調查以瞭解事件發生的真正原因。惟有如此，缺失才能被修正、改進才能夠被執行、學習重點才能被識別、相關知識才能被進一步分享，以避免事故再度發生。

風險管理

風險管理是將來自危害識別、事件報告等機制取得的資料，經過調查與分析後所進行的相應措施，以減緩事故風險。

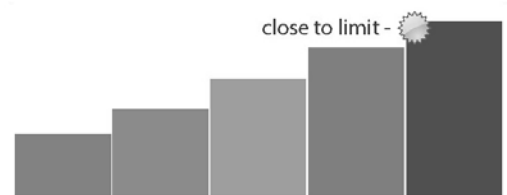
藉由此種作法，業者可向主管機關與客戶們展示它們控制運作的能力－它們會注意任何可能的風險並管理風險，以避免事故的發生。



AS LOW AS
REASONABLY
PRACTICABLE

績效衡量

設定安全績效指標以監督任何偏異的情況，並在事故發生前採取適當的作為。應注意指標間相互的關係，某個單獨指標或許仍在容許值內，但配合其他指標來觀察，就可能預示某種嚴重事故的可能。因此，如何調整指標的相關性並監控、衡量其後續發展以避免嚴重事故發生，就成為SMS中一個極有價值的要項。



績效監控與衡量提供組織一個得以迅速反應實際情況的監督工具，並將工作焦點集中在值得注意的事務上。這個要項能確保SMS主動性並導向預期的安全管理目標。

QUALITY
MANAGEMENT
TO IMPROVE
SAFETY
PERFORMANCE



品質保證

有效的SMS係由品質保證工作所支持。各SMS要項都必須內建良好的品質保證機制，包括稽核管理、文件管理與矯正/預防措施等內容。

稽核管理

這是一種強制性的工作，以保證組織內無論飛行、維護或訓練工作，均已依

據民航主管機關設定的嚴格法規來執行。稽核管理確保所有的政策與程序不僅被遵從，而且是依據相應的標準與規定而嚴格執行。它不但有助於法規的符合，並可識別出可能缺失或需要加強改進之處，組織可依此進行主動管理、改善作為以增進安全。

稽核管理是一個包含排程、計畫、執行與追蹤(結案)等環節，以支持組織廣泛改善作為的封閉迴路。

文件管理

文件管理的目標在於確認在任何必要的地方均可以取得正確的相關資訊。藉由這種確認，員工可閱讀並理解與其工作有關的所有文件，藉以強化稽核程序的執行成果。

文件管理的效益來自以下幾方面:

- 減少科層結構
- 在必要處修正應提供之資訊
- 效率與效果並重的變革控制
- 管理系統的適法性
- 維持組織內集中式管理體系

矯正/預防措施

管理系統中「不一致性」(non-conformance)的能力是任何品質保證系統中最重要的一個環節，而這種能力即來自於矯正/預防措施(Corrective Action/Preventive Action, CA/PA)。

自動化流程與聚焦於重點區域均可提高這種矯正/預防措施的效率。就航空業者而言，這也意味著能夠識別、管理、控制及改正所有不一致之處，以符合法律與規範的要求。

自動化的CA/PA目標如下:

- 簡化系統中的「不一致性」檢查
- 擴展集中化的「不一致性」稽查作業
- 提升系統化的「不一致性」管理作為
- 通知並管理不一致行為以減少重覆發生
- 簡化「不一致性」管理以增進相關人員信心

組織文化

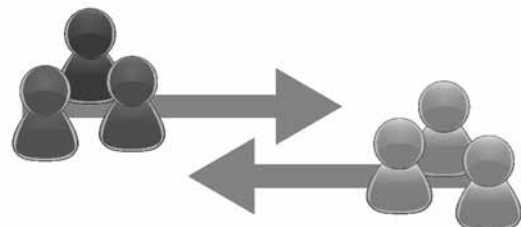
SMS惟有在整個組織均能接受並支持所有流程時，方能發揮效果。SMS不應僅只是作為符合法規要求的工具，而應被視為每個員工均瞭解並相信的措施。要達到這個境界，必需建立一個開放的安全文化。組織文化有以下兩種交流方向：

- 自決策者與政策制定者的方向

與

- 自基層作業員工的方向

有效的SMS來自權責主管由上而下的承諾以及組織內成員的個人承諾。組織文化需要能夠反映出開放性交流與持續改善的特質，而這兩者均取決於管理者與員工間的信任程度。



只有在安全資料被妥善分析、工作流程依序獲得改善等情況下，開放文化所激勵出的報告系統才能夠發揮真正作用；安全資料分析與工作流程改善又進一步在組織內營造了學習與分享的文化。藉由調查與分析等工作，我們可以進行改正、學習與分享。

建立安全文化需要組織內成員擁某些關鍵特質：

- 持續尋求改進
- 對危害保持警覺
- 承諾安全責任

SMS的效益

如果能有效實施，安全管理系統將成為組織內無價的應用工具。除了可藉由消弭事故風險以增進飛航安全外，還可以因為減少重覆作業與重要資源正確配置，而獲取其他方面的效益。

結論

依循ICAO 安全管理系統架構與其實施程序及組織內優良的安全文化，您可以有絕對的信心：貴組織不但能夠符合各種法律與規範，更重要的是展現出了內部治理、狀況警覺以及有效管理的組織能力。✈

簡言之，一個良好管理與實施的SMS 可以：

- 提供主動式的安全管理途徑，而非被動式的事後檢討方式
- 藉由事故預防來減少生命與財產的損失
- 提供與主管機關互動的有效介面
- 展示主動管理技巧，以贏取客戶的信任
- 藉由組織控制風險的能力，減少保險金支出
- 藉由流程參與與承諾，連繫員工向心力

譯自Gael 公司白皮書

Successful SMS Implementation Leads to a Successful Business



What is a Safety Management System?

At a very basic level the definition of a Safety Management System (SMS) is a means by which an organisation manages safety to prevent accidents. An SMS is proactive in nature, not reactive, and has a fundamental purpose in being able to manage safety risks and hazards before they lead to an accident, therefore preventing an accident from occurring rather than reacting after the event.

This white paper focuses on the requirements of an SMS within the Aviation industry by exploring the elements and processes that an organisation should follow to implement a successful and effective SMS.

The many benefits of a successful SMS implementation go beyond being compliant and safe. There are a number of business benefits that can be gained from this.

How the The International Civil Aviation Organisation (ICAO) define a SMS

An SMS is a system to assure the safe operation of aircraft through effective management of safety risk. This system is designed to continuously improve safety by identifying hazards, collecting and analysing data and continuously assessing safety risks. The SMS seeks to proactively contain or mitigate risks before they result in aviation accidents and incidents. It is a system that is commensurate with the organization's regulatory obligations and safety goals.

Introduction

Within the Safety Management Manual, ICAO structure the framework of an SMS around 4 components which then have elements attached. These are:

1. Safety policy & objectives

- a. Management commitment and responsibility
- b. Safety accountabilities
- c. Appointment of key safety personnel

- d. Co-ordination of emergency response planning
- e. SMS documentation

2. Safety risk management

- a. Hazard identification
- b. Safety risk assessment and mitigation

3. Safety assurance

- a. Safety performance monitoring and measurement
- b. The management of change
- c. Continuous improvement of the SMS

4. Safety promotion

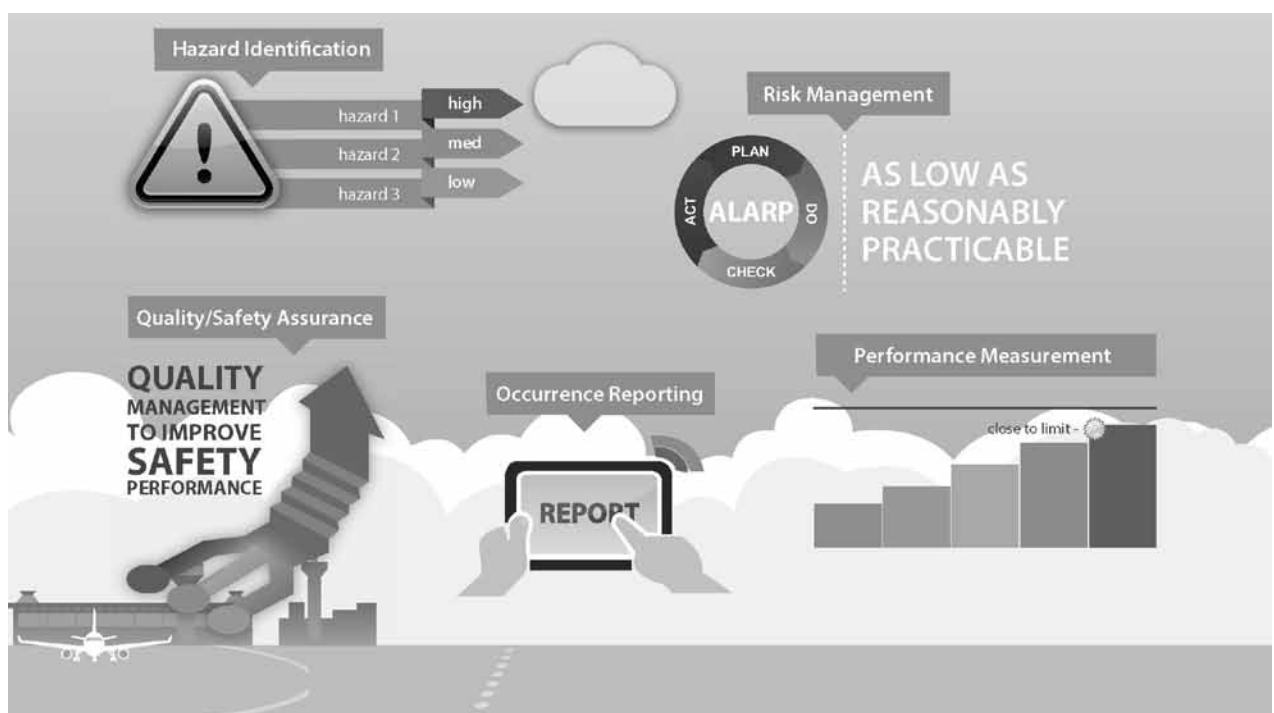
- a. Training and education
- b. Safety communication

It is important to note that all of these elements will be included in an SMS regardless of organisation size; the complexity and detail involved will be scaled up or down dependant on size but none of the components should be ignored or left out.

Organisation culture will play a crucial role in an effective SMS, with its effectiveness also relying upon commitment from senior managers combined with a commitment from all employees. In order for this to be effective, there should be a culture of open communication throughout the organisation, which facilitates continuous improvement. This sharing of information goes beyond communicating internally within individual organisations, but also extends out to the wider environment with incidents, and the learnings from them, being shared across the industry.

Key Processes of an SMS

The above components and elements set out in the ICAO Safety Management Manual can be structured around some key processes. These are:



Hazard Identification

An SMS is proactive in nature. Therefore, the process of identifying hazards that have the potential to cause harm is the first step in preventing an accident from happening. There are a number of sources from which hazards can be identified.

These include:

- reporting
- internal investigations
- trend analysis
- flight data analysis
- monitoring day-to-day operations
- and information exchange with other operators.



The preferred methods for maintaining a proactive approach are to monitor and to encourage reporting before an accident occurs.

Occurrence reporting

It is a fundamental requirement of an SMS to provide a facility for the formal reporting of identified potential safety hazards. Again, encouraging the proactive nature of an SMS, reporting allows all staff to report on what they see to allow investigation and follow up to prevent an accident from occurring. This means that reporting is not only about capturing details after an incident occurs, but is also about capturing details on what could happen.



The benefits of reporting are only achieved when the captured data is analysed, in turn leading to improvements in working practices. The analysis and resultant business improvement work encourages a learning and sharing environment.

Analysis and investigation leads to a greater understanding of why something has happened. Only then can it be corrected, learnings identified, improvements implemented and that knowledge shared to prevent this from occurring again.

Risk Management

By taking the data captured through hazard identification and reporting, the data is investigated and analysed to put measures in place to mitigate the risk to prevent accidents.

In doing so, an organisation demonstrates to regulators and customers that they are in control of their operations. They are aware of potential risks and are managing them to prevent an accident from occurring.



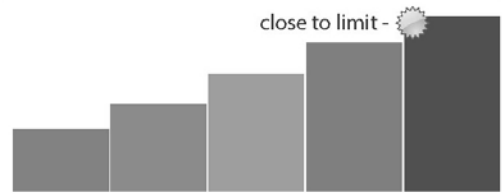
Performance Measurement

Safety performance indicators can be set and monitored for any deviations in them to allow action to be taken before an accident occurs. These can be tied to related indicators. Something in isolation could be deemed to be acceptable but combined with another indicator, could lead to a serious accident. Therefore, correlating data and

monitoring and measuring the performance can be key to preventing serious accidents and is a valuable component of an SMS.

Performance monitoring and measurement provides oversight for an organisation and an “at a glance view” of where something is wrong and what should be focused on.

This element of an SMS ensures it is proactive and leads to anticipative safety management.



Quality Assurance

An effective SMS is underpinned by the principles of quality assurance. Therefore the other elements outlined should have quality management as the foundation to build on. Within that there should be a focus on managing audits, documents and corrective and preventive actions (CAPA).



Audit Management

This is a mandatory task to ensure all organisations associated with flying, maintenance and training are performing to the strict regulations set out by the governing bodies. Audit management ensures all policies and procedures are not only being followed but are also working, verifying that processes adhere to standards and regulations. Audit management contributes to compliance with regulatory standards and identifies shortfalls and areas of improvement. Again, allowing organisations to proactively manage change to improve safety.



Audit management is a closed loop process from scheduling, planning, conducting and following up to support organisation wide improvement. The stages are:

- scheduling
- preparation
- conducting
- close-out

Document Management

The objective of document management is to ensure that the correct information is available at the point of need. This enhances the audit process by providing documentation that proves that employees have read and understood all documents relevant to their job role.

Controlling documents in a central system reduces the bureaucracy involved in document management within a compliance management environment, and extends accessibility of controlled documents throughout the organisation.

The benefits of document management include:

- reduced bureaucracy
- correct information available at the point of need



- efficient and effective change control
- compliance to management systems
- collective ownership of management system throughout the organisation

CA/PA Management

The ability to manage non-conformances is an essential part of any quality management system. This is essentially the ability to manage non-conformances through Corrective Action/Preventive Action management (CA/PA).

The efficiency of this can be enhanced by automating established workflows and highlighting areas of improvement. For Aviation organisations this means identifying, managing, controlling and correcting areas of non-compliance in order to correct and pass any type of regulatory requirements.

The objectives of automated CA/PA Management are to:

- Simplify the non-conformance process for the business within a single system
- Extend the non-conformance process throughout a business with a centralised approach
- Promote a systematic approach to non- conformance management
- Notify and manage those responsible for non-conformances that in turn promotes reduction in recurrence
- Streamline non-conformance management to increase provide reassurance to stakeholders

Organisational Culture

An SMS will only be effective when the entire organisation adopts and supports the processes required to make it work. The SMS shouldn't be considered to be merely a compliance tool but as something that everyone understands and believes in. The key requirement for that is an open culture. This is a two way process:

- decision makers and policy makers and management in one direction

and

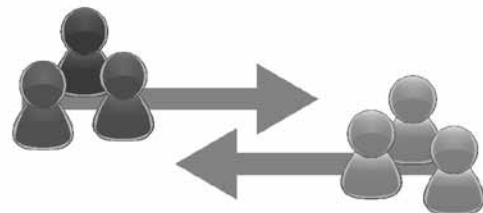
- day-to-day activities of employees in the other direction

An effective SMS requires a top down commitment from accountable managers combined with a personal commitment from employees. The culture should facilitate open communication throughout the organisation and should be one of continuous improvement. Creating and facilitating a culture of this nature depends on trust between managers and employees.

An open culture that encourages reporting is only useful when it leads to analysis of the data captured which, in turn, leads to improvements in working practices. Analysis of reports – and the work done on improvements from that – leads to a culture of learning and sharing throughout the organisation. Through investigating and understanding why something has happened, we can correct it, learn from it and share it.

Building a safety culture in this nature requires embedding characteristics throughout the organisation. The culture throughout the staff should:

- continuously seek improvement
- be vigilant to all hazards



- be committed to safety responsibilities

Benefits of an SMS

Implemented effectively, an SMS will be an invaluable tool for an organisation. In addition to improving safety by reducing the risk of accidents, the SMS allows for better allocation of resources, reducing duplication of effort to ensure resources are allocated to areas that are important and require to be focused on.

In summary, an SMS, when implemented and managed effectively:

- Offers a proactive method of improving safety to prevent accidents rather than a reactive post-accident approach
- Reduces loss of life and injuries through prevention of accidents and incidents
- Provides an efficient interface with regulatory authorities
- Demonstrates a proactive approach to safety to customers, enhancing reputation
- Reduces insurance premiums through being able to demonstrate that the organisation is in control of risks
- Improves employee satisfaction through involvement in, and commitment, to the process

Conclusion

ICAO have laid out the framework that can be used as the foundation for a robust safety management system. By utilising this alongside implementing processes and an organisation-wide safety management culture, an organisation can be confident that they are not only compliant to regulations, but are also demonstrating oversight, awareness and effective management of their entire organisation. ✎

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