出國報告 (出國類別：訓練)

新加坡 IATA 進階安全管理體制班
IATA Advanced Safety Managements for Civil Aviation

服務機關：桃園國際機場股份有限公司

姓名職稱：蕭力文 助理工程師

派赴國家：新加坡

出國期間：2014/7/6-2014/7/12

報告日期：2014/10/12

摘要

一、 課程背景

本進階課程內容提出以績效爲導向的安全管理系統管理工具，適用於航空公司、機場、航管，以及其他航空營運業者，由國際航空運輸協會 (IATA) 定期舉辦，爲航空產業中已建置安全管理系統 (以下簡稱 SMS) 之進階課程，其訓練內容涵蓋：安全管理概念、危害與風險、風險評估與緩解、學習的文化、安全資料管理、安全文化、人爲因素及安全保障。

二、 講師

Captain Mohammed Aziz, Ph. D.

Captain Mohammed Aziz, Ph.D., is advisor to MEA's chairman since 2002, chairman of the IATA IOSA Oversight Committee and of the Arab Air Carrier Organization Safety Committee and AVSEC W/G. Prior to that he was head of Operations and head of corporate safety for many years at MEA. He was also member of the IATA Operations Committee and the IATA Safety Committee, chairman of the IATA Human Factors W/G and member of the GAIN Steering Committee. In these capacities he participated in the development of many industry initiatives.

An active flying pilot with more than 19,000 flying hours, he is also a certified ICAO AVSEC Professional Manager, a certified ICAO security auditor and instructor, a certified IATA instructor and a lecturer on Safety and Security management in various academic MBA programs. In these capacities he developed and delivered many aviation operational, safety, security and human factors courses, wrote many books and papers on safety, security, air navigation and the environment and carried many international audits.

Captain Aziz is also a certified Air Safety Investigator who participated in and led many international accident and incident investigations. He has an extensive management experience in airline operations, safety, security and quality.

Academically, he has a Ph.D. from the University of Alexandria, an Aerospace MBA from the Toulouse Business School, a MBA from Cambridge Int'l University, a MA and a BA from the Beirut Arab University.

三、 學員背景概況

本次課程共有 19 名安全管理領域的人士，分別來自於航空公司、航管單位、機場公司及民航學院：

派訓單位	人數
Air Navigation and Weather Services (Flight Safety Foundation - Taiwan)	1
CAE Oxford Aviation Academy	1
China Airlines (Flight Safety Foundation - Taiwan)	1
EVA Air (Flight Safety Foundation - Taiwan)	1
Singapore Airlines	5
Taoyuan International Airport Corporation (Flight Safety Foundation - Taiwan)	1
TransAsia Airways (Flight Safety Foundation - Taiwan)	1
Vietnam Air Traffic Management	8

四、 參訓課程摘要

	July 7	July 8	July 9	July 10	July 11
9:00-10:30	Session 0 &1 Welcome, SMS Concepts Update	Session 2 Hazards and Risks	Session 3 Learning & Documents in SMS	Session 4 Culture and Human Factors	Written Exam
10:45-12:15	Session 1 SMS concepts Update	Session 2 Hazards and Risks	Session 3 Learning & Documents in SMS	Session 5 Safety Assurance	Group Presentation
Lunch					
13:15-14:45	Session 1 Exercise	Session 2 Exercise	Session 3 Exercise	Session 5 Safety Assurance	Group Presentation
15:15-17:00	Session 1 Group Presentation	Session 2 Group Presentation	Session 4 Culture and Human Factors	Session 4 Exercise	Course Review and Closing Ceremony

1. 安全管理概念與新知 (Safety Management Concept Update)
   - 安全管理原則
   - 事故因果理論
   - 安全風險管理
2. 危害與風險 (Hazards and Risks)
   - 危害辨識
   - 風險評估
3. 安全系統的學習與文件化 (Learning and Documents in SMS)
   - 系統安全缺失

- 個人與組織學習
- 安全報告資料的管理與深度使用

4. 安全文化與人爲因素 (Culture and Human Factor)
   - 安全文化的挑戰與方法
   - 安全訓練與適任
   - 安全管理系統的人爲因素
5. 安全確保 (Safety Assurance Issue)
   - 安全確保
   - 作業安全管理
   - 安全成本

目次

本文

一、 目的

ICAO 於 2013 年 11 月出版 Annex19 安全管理，整合其他附錄與安全管理系統有關之內容，可見安全管理於航空各領域之重要性。而爲掌握安全管理系統之發展、管理知識與技巧，以及其表現之評量方式，並透過相關管理技巧有效降低安全成本，培養主動管理安全危害、積極落實安全文化之安全人員，飛安基金會選派航管、航空公司，以及機場單位人員至新加坡 IATA 訓練中心進行進階安全管理之培訓，以加強各單位安全管理系統之落實。

二、 內容

1. 安全管理概念與新知 (Safety Management Concept Update)

安全管理系統 (Safety Management System，下面簡稱 SMS) 在航空業面臨的課題包括：SMS 是否能被所有人相關人員了解？安全係數提升是否表示 SMS 是有效的？SMS 是否只是安全管理者制定的計畫亦或應全員參與？以看醫生爲例，雖然醫生能夠給予病人適當的治療並開處方藥，但真正必須服藥以戰勝疾病的仍是病人本身，故因全員皆能參與才能使 SMS 發揮最大功效。

1.1 安全的定義

而何謂安全？零事故？免除所有危險或風險？避免犯錯？符合規範？首先，根據墨菲定律「凡是可能出錯的事均會出錯」，雖然每一件事故都可以預防，但是 (尤其以長期而言) 事故不可能不發生，因此以零事故當成是否安全的判斷準則可能有失恰當；第二，如果要免除可能的危險或風險，以航空公司爲例，除非停止飛行，否則組織在營運的過程中一定會暴露在相當的風險之下；第三，只要有人，就會有人爲因素的產生，也就可能犯錯，因此只要有人爲參與的活動就很難避免錯誤的發生；最後，很多人都不小心落入錯誤的迷思，認爲只要符合國內、國際的規範就是安全的，然法律、規範僅代表最低要求，意即指符合法規規定的狀態是將組織的安全狀態擺在極高風險的邊緣，只要有一個疏漏，便將組織的活動暴露在高危險的環境中。

根據 ICAO doc 9859 的定義，所謂安全是透過持續的危害識別和風險管理過程，將對人員或財務的損害風險降低、維持或低於合理可接受的風險狀態。所

謂的合理可接受視不同組織而有所差異，因爲每個組織的規模、特性不同，對於安全損害 (包括財損、商譽等) 的承受程度也有所差異。而合理可接受的風險狀態應落於圖 1.1 的 Living Space 範圍，每個組織應根據組織規模在安全與投入成本之間尋求平衡，投資過多資本在安全上可能使公司面臨財務的危機，但投入過少就可能使組織面臨安全上的危害。

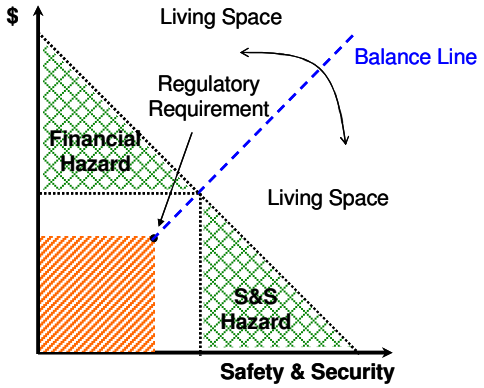


圖 1.1

1.2 安全系統運作架構

安全系統的運作如同其他的管理系統可透過 5P 模式說明(如下圖)，哲學 (Philosophy)：了解系統運作的原因 (Why)；政策 (Policy)：了解系統運作的目標 (What)、過程 (Processes/Procedures)；如何執行 (How)、 實踐 (Practice)：實際操作；表現 (Performance/Measurement)：透過績效來評估系統是否按計畫執行，並進行修正。在架構或修正安全管理系統時，可透過 5P 模式自我檢視，爲何要有 SMS？SMS 目標爲何？以何種方法進行？如何執行？如何評量 SMS 的成果？

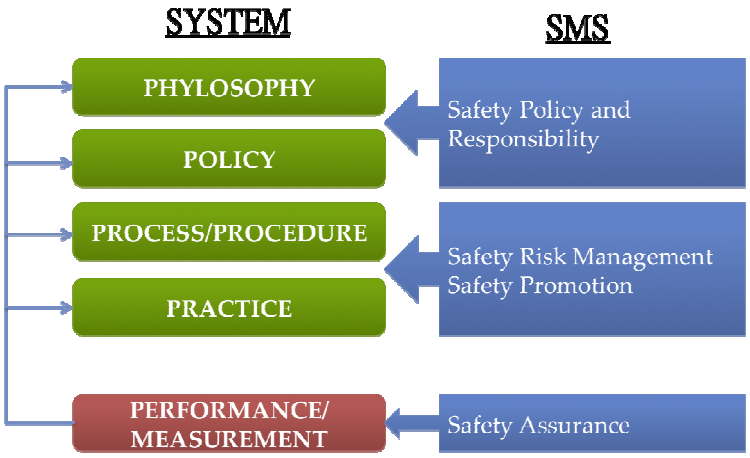


圖 1.2 SMS 運作的架構與 5P 模式對應圖

1.3 安全政策

安全政策描述安全管理系統的目的，一個組織的安全政策應包含：高階管理者對安全的承諾、設定組織的安全哲學 (願景)，作爲後續安全目標與計畫的指導方針、對其職員與利害關係人 (如顧客、公眾) 的雙向溝通機制、定期檢視並修正，以確保其適宜性。

此外，擬定安全政策亦須注意下列事項：安全政策儘量不要以經理人/執行長的第一人稱撰寫，可以減少因爲人事變動的修改；符合安全規範表示只能維持最低限度的安全，建議各組織應以追求更高於國際規範的安全水平爲目標；除了積極鼓勵組織全員參與之外，也要鼓勵所有的權益關係人 (包括外包廠商) 參與組織的安全管理系統；安全政策是提出安全管理系統的一般性指導方針，注意不要太過著重於細節。

2. 危害與風險 (Hazards and Risks)

2.1 危害識別

進行危害識別與風險估計與評估前，必須先了解危害與風險的差異，危害是可能造成損害或傷害的事件或情況；風險則是危害可能產生損害和傷害的機會，是以損害的嚴重程度和可能性作爲衡量指標。

危害的識別除了透過事故、事件調查報告等的安全資料進行收集、分析來檢視之外，可以培養員工在工作環境中辨識危害的能力，從例行性的作業發現問題，另外，在危害識別的過程中也必須考慮人爲因素，而與人爲因素有關的安全資訊便需要透過有效的雙向溝通機制來取得，如自願性報告。

值得注意的是，從 Reason 提出的瑞士乳酪理論 (Swiss Cheese Model) 來看事故的發生(圖 2.1)，可以發現大多數最後防守機制的失守都是人爲因素造成的。這種現象並不能表示都是人爲因素造成多數的事件發生，因爲實際上從模型中可以看出，一個事件並不是一個單一錯誤造成，因此安全人員在進行危害識別和風險分析時必須思考，爲什麼在這個環節會造成人的錯誤的產生，以發掘更上層不易顯見的危害。

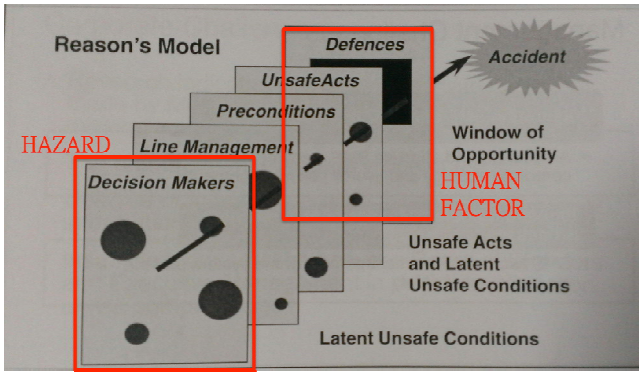


圖 2.1

在實務操作上，進行危害識別的時機包括當安全相關事件數目增加、操作或系統設備重大變更、組織進行重大變更等情事發生時應著手進行。進行危害識別時則應考量人為因素、分析方法 (如失效模式與效應分析)，資料來源可為事件、事故調查報告或其他安全相關資料，從取得方式可將資料來源可再區分為內部或外部資料：

1. 內部資料：FDR、CVR、自願性報告系統 (Confidential Reporting)、年度調查 (Annual Surveys)、定期安全查核 (Periodic Safety Audit)、LOSA、QA、訓練、模擬統計資料、事件調查報告等。
2. 外部資料：失事調查報告、國家強制事件報告系統、國家自願報告系統、國家查核、資料交換系統

2.2 風險評估與風險控制

風險管理五大步驟為危害識別、風險嚴重性評估、風險機率評估、風險接受度評估、風險控制或緩解。在確認危害之後，可透過質性或量性指標來評估風險的嚴重程度和發生機率，接著由上述兩項指標得出的風險程度判斷危害所導致的風險是否可被接受，若無法接受則應採取相關措施以降低至可接受之程度。

風險機率、風險嚴重性，以及所得之風險程度等指標的定義均可視組織狀況進行調整，如同第一單元所述，根據公司規模和其他特性的差異，其所能承擔讀安全程度不同，因此對於相同的風險可能會有不同風險值的認定。

風險控管可以藉由消除 (消除或防止危害的發生)、降低 (降低發生的機率或嚴重程度)、轉移 (保險)、保留 (經管理階層同意)等策略來達成。其中，在降低危害風險的風險控制策略中，降低發生機率表示此種策略的執行可以降低發生風險的次數，例如：透過增加跑道長度來減少航空器落地時沖出跑道的可能性；另

一方面，降低發生的嚴重程度則表示事件仍會發生(機率相同)，但是在策略執行後發生的後果影響較小，例如：增加跑道緩衝區，即使航空器衝出跑道，因緩衝區的設置讓四周障礙物減少，可以降低航空器受損的狀況。

2.3 安全管理策略

安全管理策略據其資料來源及特性可分爲被動式 (Reactive)、主動式(Proactive)及預期式 (Predictive) 3 種策略方法。其中被動式策略是對已發生之事件或事故採取反應；主動式策略是積極經由分析組織活動以識別安全風險，並降低系統失敗機會；預期式策略是針對從未在組織內發生的事件進行的預防措施，可透過取得實際操作表現、他山之石或自願性報告系統資料進行分析研擬。

3. 安全系統的學習與文件化 (Learning and Documents in SMS)

3.1 組織學習

SMS，是一套有系統性的安全管理方法，其中包含必要的組織架構、可靠性、政策與流程等相關要素配合。同時，強調組織內部應建立由上至下的安全管理觀念，而安全管理的建立必須上達管理階層之層級。因此，在推展 SMS 的過程中，可以善加利用以學習性組織著稱的第五項修煉 (The Fifth Disciplines) 的精神。

第五項修煉爲管理大師彼得聖吉 (Peter M. Senge) 所提出的理論，其所著重的爲系統性思考，與 SMS 所強調的系統性管理不謀而合。系統思考是指從片段轉成整體，從微觀轉成巨觀，從單向轉成雙向的思考方式。透過不同層次的思考，體會系統的存在與重要性，同時培養「以組織進行學習，以組織促進學習」的學習性組織。

第五項修煉內容包含：

1. 自我超越 (Personal mastery)：激發創造性的張力；
2. 改善心智模式 (Mental models)：消除根深蒂固的思考；
3. 建立共同願景 (Shared vision)：共同開創組織的未來；
4. 團隊學習 (Team learning)：深度的對談能促進團隊親和與團結；
5. 系統思考 (Systems thinking)：從寬廣的角度看世界。

SMS 導入組織的過程中，應納入上述五項主軸，並以此理念持續提升安全作爲。一如 SMS 之精神在於由最高管理階層至一線員工，皆瞭解且願意負起本身之安全責任，所以安全政策，也應當是組織所有成員的承諾。組織運用系統思

考的方式，透過教育訓練促進團隊學習，消除錯誤的固執或發掘問題，才能有效建構安全文化並引發組織成員的創造力與向心力。

3.2 文件化

建立安全學習庫 (Learning repository) 可以讓組織員工儲存、分類、取得、分享與安全有關的資料、文件和知識。其中，安全資料庫應包含正式的事故、事件資料(事故報告、資料、因果關係)，以及內部安全管理系統資料、內部報告、危害識別、風險分析、改善方案研究、安全與風險控制之決策等文件。而透過安全資料管理系統所產出的資訊，可以作爲執行正確的安全控制作爲、主動性及長期風險管理策略的參考依據。

安全資料蒐集及處理系統 (Safety data collection and processing systems, SDCPS) 是SMS的基礎，於ICAO ANNEX 13 Incident Reporting, Data Systems and Information Exchange 指出其爲處理與報告系統、資料庫系統、資料交換系統或儲存資訊，如失事調查、自願報告系統等。不論組織規模大小都需要建立文件管理系統，而在安全記錄和資料的儲存上必須考量 SMS 的規模與所需技術、資料庫規模、管理系統及資料保護等需求，並與其他有關系統、界面進行整合，如管理資訊系統、內控系統、平衡計分卡、安全文件與手冊、安全記錄與資料、資料的分配、取得與稽核等。

4. 安全文化與人爲因素 (Culture and Human Factor)

安全文化是由獨立個體或群體共同的價值觀、態度、能力與行爲表現而創造之結果，也表示人們的風險警覺。安全文化是一個系統致能器 (System Enabler)，也似人們的免疫系統，抵制外來的病毒侵略，故若組織內的每一位成員皆能承諾安全，就能促使組織能夠順利的不斷自我運作。安全文化爲人爲因素的最後一道防線，因僅 SMS 不足以降低事件發生率且人爲因素爲一複雜的課題，唯有成熟的安全文化才能減少人爲表現變異性。安全文化可分爲 5 種類型：

1. 病態型 (Pathological)：認爲安全阻礙企業運作；
2. 被動型 (Reactive)：當事故發生時才認爲安全是一門課題；
3. 計算型 (Calculative)：安全已被管理且具備基礎程序與文件手冊規範；
4. 主動型 (Proactive)：安全已涉及人員與先期指標；
5. 自我生成型 (Generative)：人員已能自然地將安全視爲企業營運的一部份。

安全文化的特性應具有以下特性：被告知 (Informed)、信任 (Trusting)、報告 (Reporting)、公正 (Just)、彈性 (Flexible)、學習 (Learning)。而組織必須定期進行調查來偵測安全文化的落實情形，包括詢問「是否認爲組織將安全擺爲優先」、「在工作時是否能發現危害和風險」、「雙向溝通管道是否暢通」、「以及你知不知道爲什麼要這樣做」等問項。其中值得注意的是，在工作中發現危害的問項，若員工認爲在工作中可以發現危害並非表示組織安全較差，相對地，這種情形顯示員工具有高度安全意識，且備有發現危害及風險的能力。

5. 安全確保 (Safety Assurance Issue)

安全保證爲飛航服務提供者對於 SMS 是否符合安全預期或需求的過程或行動，有計畫性且系統性的行動將可以達成可接受安全水準之目標。經由不斷地監視內部運作狀況、剩餘風險程度、新危害因子與管理層面的操作風險，以發覺足以產生安全風險或降低風險控管的改變或偏移。安全保證與品質保二者爲互補關係，確保飛航服務提供者的安全、品質與商業目標可達成。安全保證也必須包括系統缺陷產生潛在的安全影響之修正行爲之發展與執行。

安全保證的 3 個元素爲：

1. 安全監督與評量 (Safety performance monitoring and measurement)

   制定重要且有意義的關鍵績效指標 (KPI)，其四個面向爲：個人安全 (Personal Safety)、程序安全 (Process Safety)、領先指標 (Leading Indicators)、落後指標 (Lagging Indicators)。

2. 改變管理 (Management of change)

   一旦組織發生改變，將影響已識別的危害或風險緩解策略，故應系統性地加以管理改變。

3. 持續發展 SMS(Continuous improvement of SMS)

   可依據 PDCA 循環，亦稱爲戴明循環(Deming Cycle)，以計畫(Plan)、執行(DO)、檢查(Check)、處置(Act)四步驟不斷地持續發展 SMS。

三、 心得與建議事項

1. 安全管理系統之運作

此次的 IATA 進階安全管理體制班和過去接受的 SMS 課程不同之處在於，過去多從安全應如何控管，而本次課程是以「管理」角度切入如何管理安全，講師在課程中列舉如財務管理、市場行銷的簡易例子，協助我們能快速的瞭解安全管理系統其實和其他管理系統的運作無異，只是目標對象是安全。此外，安全並非一獨立議題，一個完整落實安全管理系統的組織，安全應無所不在，亦即，不論該組織在規劃、營運、財務或行銷等不同功能領域運作時，皆應考量決策對安全的影響，因此，在 SMS 的建構和運作上，需要思考如何與組織其他系統進行整合，已達到上述之目的。

除了系統與系統間的整合之外，在文件化的過程中，資訊系統的整合相對亦扮演相當重要的角色，而這也是我們容易忽略的議題。所謂「工欲善其事，必先利其器」，若 SMS 並未對安全資料進行有效資料管理，安全資料的可能無法有效運用，或是因取得和處理資料的不便利，造成效率的損失。另一方面，文件化的資料安全議題亦須重視，除避免因安全資料外洩而產生其他的安全問題之外，更重要的是，確保安全資料的機密性，才能鼓勵員工使用自願性報告，主動發現組織內的可能危害。

2. 組織學習之應用

如同課程中強調，SMS 不僅需要安全人員的持續學習，更需要組織的持續學習。在聖吉提出的第五項修煉中，溝通可視爲最關鍵之因素，因不論在建立共同願景、團隊學習、或是系統性思考，都需要參與人員的溝通、互動與分享。此外，藉由改善心智模式，學習讓他人理解並理解他人的思維，有更開放的心態，才能讓組織內人與人的溝通更順暢，執行任務更有效率。同樣地，透過資訊共享，除了能減少重複作業的成本，更能加速組織內的學習，提升個別人員能力。

本次課程有半數以上的時間進行課題演練和小組報告，課堂練習的題目具系統性，讓學員從安全政策與目標的建立開始，全面地參與 SMS 架構與運作的討論，講師也在討論地過程中引導大家應用組織學習的要領。雖然練習與討論仍著重於理論的應用，但從討論中仍可發掘實務上可能遭遇的問題，透過這次組織性的討論，未來亦能實際運用在實務上作業上。

3. 危害識別和風險管理實務應用遭遇之議題

有關風險管理中的風險定義，在過去的課程多告訴學員，可以參考 ICAO 9859 提供的發生頻率和嚴重程度的分類，而講師在課堂的一開始便強調，所謂安全，必須視組織的可承受程度，因此在風險的定義上亦可彈性的進行調整，以符合組織的需求。

在本次課程討論中發現，大家對於風險控制策略成效 (減少發生頻率及降低嚴重程度) 的認知並非十分明確，其中，減少發生頻率表示該策略帶來的效果會使發生次數降低，而降低嚴重程度則表示，事件仍會發生，但是所造成的後果會較不嚴重。雖然上述只是定義上的釐清，然而，安全人員必須清楚知道改善策略所帶來之效果，才能判定是否能接受改善後的風險。

另外，有關自願性報告的處理，過去多僅針對所提報的問題提出改善方案，未將其分類並進行長期的統計分析，而藉由分析不同類型提報案例的數據趨勢，可以從中發掘現場工作環境的潛在風險，當該數據持續上升，而無相對應的預測性策略加以防範，亦是組織內安全的警訊，由此可知，自願性報告對於偵測潛在危害的重要程度，以及在資料處理上還有很大的應用空間。

4. 安全文化與安全確保的重要性

講師一再強調，安全文化並非 SMS 的最終目標，而是加速 SMS 運轉的潤滑劑。安全文化會影響組織內員工的表現，又因人容易受同儕壓力的影響，即使有完整安全作業手冊、SOP 或規範，若大部分的群體行爲仍是維持不安全的作業模式，或是不具有安全的觀念之下，上述的安全規定將形同虛設。另外，安全文化的建立最重要的是鼓勵雙向的溝通，講師在課堂中多次提及醫生與病人之間的關係，安全人員猶如醫生，醫生在沒有病人描述自身的身體狀況之下，只能客觀的就所見進行判斷，不見得能發現真正的病因，同樣地，唯有操作人員陳述相關的事實經過，安全人員才能逐步發現可能的危害與風險。

最後，安全系統的運作不是發現風險改善風險即可，如同一個公司的發展一樣，每年設定營運目標，然後逐年檢討是否需要改變營運策略，安全管理系統運作亦同，必須訂定目標，定期檢討，並且要定期透過稽核和調查來檢視 SMS 實際的運作情形與組織安全文化的狀態，其中，在安全文化的不分，講師尤其強調，在安全文化的認知上，首要針對安全人員進行調查，確認安全辦公室的成員是否瞭解、認同組織的安全政策目標，因爲唯有安全核心人員將安全置於第一，向下

發展出來的策略才可能朝更安全的方向邁進。

建議事項

1. 英文版作業規範

目前本公司的作業規範仍未全面英文化，除了提供外籍航空公司、工作人員更友善的資訊環境之外，在本次受訓過程中發現，缺少國際語言的平台，會讓資訊分享上多了一層障礙，十分可惜，因此建議公司應儘速將相關公開資訊英文化，加強本機場軟體的國際化。

2. 主動式與預測性策略之分析與研擬

預測性策略源自於其他幾場案例或是自願性報告分析趨勢，意即對未在本機場發生之危害進行的防範措施。以鳥擊防制爲例，鳥擊報告顯示當前機場的鳥擊情形，統計、分析鳥擊報告是針對已知的危害鳥種進行防範。然潛在鳥擊風險鳥種無法由上述資料得知，必須藉由如機場鳥項調查、鳥網防制、驅鳥防制情形來判斷鳥類活動的變化趨勢，目前本機場已著手進行，而上述分析需累積長時間的資料支持，以期提出有效之預防策略。另外，本機場亦需加強場面上鳥屍 FO 的統計分析，由於鳥屍 FO 所代表意涵爲「已發生但並不嚴重的事件」，收集並統計該項趨勢，有助於發現潛藏在本機場的鳥擊風險。

3. 變革管理

在組織變動時需要針對變異的部分進行風險分析管理，以確保變革過程中所產生的風險不會影響目前的安全。而目前桃園機場有多項重大工程執行，以鳥類防制爲例，這些工程與環境改變對於鳥類活動之影響目前僅能由後續之觀察獲得，未來建議能協同生態調查專家，針對機場環境重大改變導致的鳥類活動或遷徙可能的改變進行風險分析，識別高危害風險的鳥種，進行預防性策略，或提出警示，以提升在環境變動下對機場內鳥擊風險之掌控。

4. 稽核與安全文化之檢視

本公司在 SMS 已實行多年，鳥類防制計劃小組也在去年 4 月成立，雖然 SMS 持續運作，然目前仍缺乏檢核機制來檢視 SMS 的運作情形。另外，除了透過稽核來檢討 SMS 的執行狀況，每年亦須定期進行安全文化的調查，唯有了解組織的安全文化程度，才能確定後續 SMS 執行策略方向，這也是本公司 SMS 可以更加精進的部分。

5. SMS 的整合

SMS 並不是只有執行作業的部門才需重視，組織的任何一個單位都必須重視安全，即便是營運、行銷、財務、工程部門亦同，因此 SMS 的執行需要跨部門進行整合，而安全辦公室需掌握整個組織的安全情形，以確保組織的每個部門在規劃、執行階段皆能保障安全。而就目前的觀察，本公司的 SMS 執行偏向地方自治，而缺乏中央統籌，其中可能會有各處室權責劃分不清的問題，另，缺乏更上位階的安全辦公室，在稽核與檢討 SMS 運作上亦缺乏公權力，可能會面臨執行效率不佳的問題。

此外，就安全辦公室的組成，講師建議除了部分專職安全人員 (須具備實務操作經驗) 之外，亦須含括仍任職於各執行單位的兼任安全人員，才能確保安全辦公室能掌握組織內安全實際執行狀況，並確保其視野更具廣度與深度。

6. 權益關係人之管理

機場的安全並非只與機場單位有關，其他與安全有關的權益關係人，包括航空公司、地勤公司、倉儲公司、油公司、空廚公司、航警局、航管單位等亦是確保機場運作安全的重要角色，因此如何要求各單位配合推動機場的 SMS 便是本公司需要克服的議題。除了建立罰則之外，參考澳洲 CAE Oxford Aviation Academy 品質與安全經理實務上之經驗，建議機場公司在與各相關單位簽約或協議書時可以將配合本公司安全管理政策推行作爲契約或協議項目之一，以增加安全管理委員會要求之效力。

附錄一：課程相片

IATA 訓練教室

上課參與情形

授課講師與學員合影

台灣學員結業合影

附錄二：練習題

Exercise 1: Safety Policy Exercise

With reference to the examples below in your group write a policy statement for an air navigation service provider, based on ICAO SMM and class material, following each of the required or necessary elements.

Example 1:

Safety is one of our core business functions. We are committed to developing, implementing, maintaining and constantly improving strategies and processes to ensure that all our aviation activities take place under a balanced allocation of organisational resources, aimed at achieving the highest level of safety performance and meeting national and international standards, while delivering our services.

All levels of management and employees are accountable for the delivery of this highest level of safety performance, starting with the [chief executive officer (CEO) /managing director/or as appropriate to the organisation].

Our commitment is to:

- **Support** the management of safety through the provision of all appropriate resources that will result in an organisational culture that fosters safe practices, encourages effective safety reporting and communication, and actively manages safety with the same attention to results as the attention to the results of the other management systems of the organisation
- **Enforce** the management of safety as a primary responsibility of all managers and employees
- **Clearly** define for staff, managers and employees alike, their accountabilities and responsibilities for the delivery of the organisation's safety performance and the performance of our safety management system
- **Establish and operate** hazard identification and risk management processes, including a hazard reporting system, in order to eliminate or mitigate the safety risks of the consequences of hazards resulting from our operations or activities to a point which is as low as reasonably practicable (ALARP)
- **Ensure** that no action will be taken against any employee who discloses a safety concern through the hazard reporting system, unless such disclosure indicates, beyond any reasonable doubt, an illegal act, gross negligence, or a deliberate or wilful disregard of regulations or procedures
- **Comply** with and, wherever possible, exceed, legislative and regulatory requirements and standards
- **Ensure** that sufficient skilled and trained human resources are available to implement safety strategies and processes
- **Ensure** that staff are provided with adequate and appropriate aviation safety information and training, are competent in safety matters, and are only allocated tasks in line with their skills
- **Establish** and measure our safety performance against realistic safety performance indicators and safety performance targets
- **Continually improve** our safety performance through management processes that ensure that relevant safety action is taken and is effective
- **Ensure** externally supplied systems and services to support our operations are delivered, and meet our safety performance standards.

(Signed) CEO/Managing Director/or as appropriate

Example 21:

Safety is the first priority in all our activities. We are committed to implementing, developing and improving strategies, management systems and processes to ensure that all our aviation activities uphold the highest level of safety performance and meet national and international standards.

Our commitment is to:

a) develop and embed a safety culture in all our aviation activities—one that recognises the value of effective safety management and acknowledges that safety is paramount

b) clearly define all personnel's accountabilities and responsibilities for developing and delivering aviation safety strategy and performance

c) minimise the risks associated with aircraft operations to a point that is as low as reasonably practicable/achievable

d) ensure that externally supplied systems and services affecting the safety of our operations meet appropriate safety standards

e) develop and improve our safety processes to conform to world-class standards

f) comply with, and, wherever possible, exceed legislative and regulatory requirements and standards

g) ensure that all staff have adequate and appropriate aviation safety information and training, are competent in safety matters, and are only allocated tasks in line with their skills

h) ensure there are enough skilled and trained personnel to implement safety strategy and policy

i) establish and measure our safety performance against realistic objectives and/or targets

j) achieve the highest levels of safety standards and performance in all our aviation activities

k) continually improve our safety performance

l) conduct safety and management reviews and ensure we take relevant action

m) ensure that an effective SMS is integral to all our aviation activities.

Example 3:

Management is committed to providing safe, healthy, secure work conditions and fostering positive safety attitudes. The organisation's owner/CEO is committed to:

- ongoing pursuit of an accident-free workplace, including no harm to people and no damage to equipment, the environment, or property
- a culture of open reporting of all safety hazards
- an open reporting culture in which management will not initiate disciplinary action against any personnel who, in good faith, disclose a hazard or safety occurrence resulting from unintentional conduct
- support for safety training and awareness programs
- conducting regular audits of safety policies, procedures and practices
- monitoring industry activity to ensure best safety practices are incorporated into the organisation
- providing the necessary resources to support this policy
- requiring all employees to maintain a safe work environment through adherence to approved policies, procedures, and training; and familiarising themselves, (and complying), with safety policies and procedures
- all levels of management, starting with the owner/CEO, being accountable for safety performance. To be a good leader, you must be a good safety leader
- the principle that the organisation is strengthened by making safety excellence an integral part of all activities

Exercise 2; Hazard Identification and Risk Assessment Exercise

With reference to the recent issues as to volcanic ash cloud exposure, within your group identify at least 3 hazards that could affect the function of air traffic service provision at an airport.

"Icelandic volcanologists have reminded the industry that an eruption by Mount Katla on the island, potentially 10 times more powerful than the eruption by Mount Eyjafjallajökull that grounded European aviation in April 2010, is overdue and could occur at any time. Speaking at a briefing in Sicily on 6 December, atmospheric scientist Dr Fred Prata, a key member of the ongoing airborne ash sensor trials team, said that if Europe's aviation decision makers had known in April 2010 what is understood now, some 98% of the grounded flights could have operated safely, in spite of the presence of atmospheric volcanic ash."

HAZARD	RISK	DEFENSE
Example Layout of the Rwy (proximity and distance between runways)	- Rwy incursion - Aircraft on approached to the wrong Rwy - Go-around Severity: hazardous Likelihood: Reasonably Probable Risk index: Unacceptable [redacted]	- ATC procedures (standard taxi routes, approach path monitoring) - Training Severity: hazardous Likelihood: Extremely remote Risk index: Review Cat 2

Exercise 3: Risk Control Exercise

Following the first day Safety Policy and second day Risks, each group will set the applicable context and describe with detail risk control activities including some procedure and feedback as is being applied within the organization.

Exercise 4: Safety Assurance Exercise

Each group will take any of the examples discussed in class as the basis to present the process description and associated procedures for the SMS safety assurance function.

Exercise 5: Safety Promotion Exercise

Each group shall elaborate and present examples with details and procedures on safety promotion function of the SMS.

附錄三：期末報告

In order to successfully implement/enhance your organization's SMS, you have decided to adopt the 5 Components Technologies developed by Peter Senge for Learning Organizations; i.e.:

- Systems Thinking
- Personal Mastery
- Mental Models
- Building a Shared Vision
- Team Learning

Using the material provided to you during the course, develop a Safety Case describing the advantages and disadvantages of such an approach, the resources required and a project time line for such an implementation.
Each group will have 25 minutes to present its case in PPT and 15 minutes for a Q & A session.
Each Group will pick one of the following organizations:

- Airline
- FTO
- Airport
- ATM

SFTC Safety Case

Sky Flight Training Centre(SFTC)

- Established in 2008
- Acquired by VieTai Company in Nov 2013
- Expected operation date: 7st Jan 2015
- Provides:
  - Flight training for initial or renewal type rating endorsement in accordance with the Singapore AOCR
- Type Rating Endorsements Available:
  - Boeing 787
  - Airbus 350
- Our Vision:
  - To Be the Safest Profitable World Class Fight Training Organization

BACKGROUND (2/3)

Organizational Structure

Management Team
- CEO/CFO
- VP Technical and Training
  - Operations Manager
- VP ***Quality/Safety and Security***
  - Safety Assurance Manager
- 3 Executive Officers

Administrative Team
- 5 Administrative Officers

Subject Matter Experts
- 40 Simulator Instructors
- 10 Ground Instructors

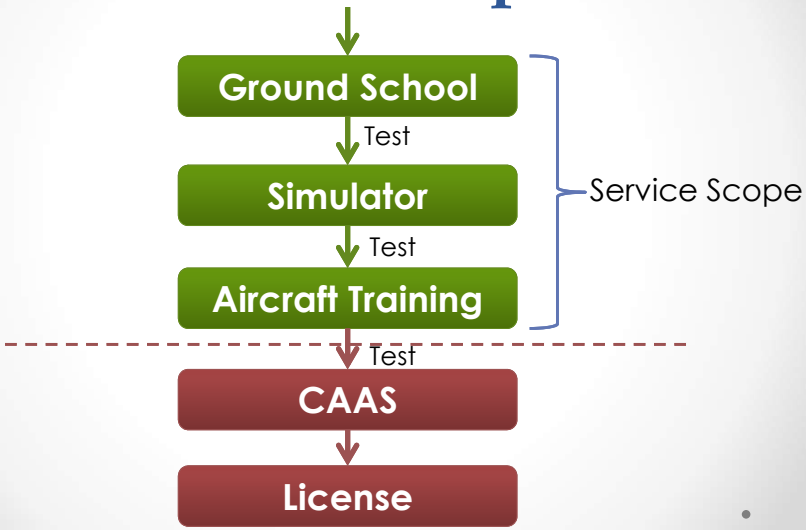
Maintenance Team
- outsourced to Alpha Company, including engineering, IT, building, etc.

Human Resource Recruitment
- outsourced to Bravo Company

BACKGROUND (3/3)

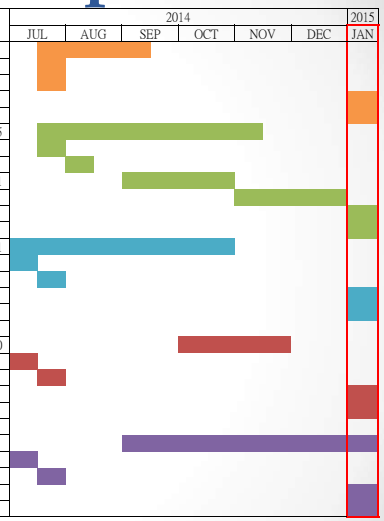
- Assets:
  - Training Centre Building: 2 Level Complex with Build up area of 59,800 Square feet
  - 2 B787 Simulators
  - 2 A350 Simulators
  - 2 B787 Aircraft (1 – leased)
  - 2 B787 Aircraft (1 – leased)
  - 20 Personal Computers

Training Process & Service Scope



Road Map

TASK/PROJECT	START	END
Implementation of emergency response planning	2014/7/10	2014/9/15
- Initial Aation group meeting to delegate the tasks required	2014/7/17	2014/7/17
- Management approval meeting	2014/7/31	2014/7/31
- Implementation	2015/1/1	2015/1/1
Implementation of Documentation Management System	2014/7/10	2014/11/15
- Initial Aation group meeting to delegate the tasks required	2014/7/18	2014/7/18
- Management approval meeting	2014/8/1	2014/8/1
- Installation of SW and HW	2014/9/1	2014/10/31
- System tests and improvements	2014/11/1	2015/1/1
- Implementation	2015/1/7	2015/1/7
Risk Assessment	2014/7/19	2014/10/31
- Initial Aation group meeting to delegate the tasks required	2014/7/9	2014/7/9
- Management approval meeting	2014/7/16	2014/7/16
- System tests and improvements	2015/1/1	2015/1/1
- Implementation	2015/1/7	2015/1/7
Safety Assurance	2014/10/1	2014/11/30
- Initial Aation group meeting to delegate the tasks required	2014/7/9	2014/7/9
- Management approval meeting	2014/7/31	2014/7/31
- System tests and improvements	2015/1/1	2015/1/1
- Implementation	2015/1/7	2015/1/7
Saftey Promotion	2014/9/1	2015/1/7
- Initial Aation group meeting to delegate the tasks required	2014/7/14	2014/7/14
- Management approval meeting	2014/7/31	2014/7/31
- System tests and improvements	2015/1/1	2015/1/1
- Implementation	2015/1/7	2015/1/7



Incorporating Senge's 5 Discipline

- Personal Mastery
- Shared Vision
- Mental Model
- System Thinking
- Team Learning

SAFETY POLICY

We are committed to the safety management system of the organization by meeting or exceeding the ICAO and national regulator's requirements. This is achieved by providing excellent and safe training services to our customers.

We will continue to provide high quality training to our employees and maintain a high level of staff proficiency at all times. We support and promote a just culture in the management of our reporting structure and systems. We will also continue to review, monitor and improve as required the safety management system in a periodic manner. Every staff, stakeholders and sub-contractors are strongly encouraged to participate and be involved in our safety management system.

Your sincerely,

HONG

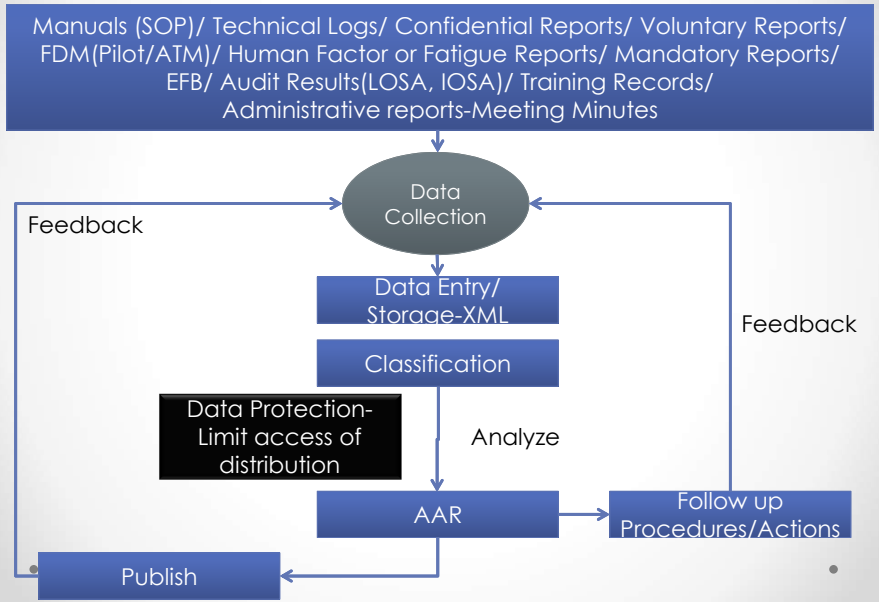
CEO Sky Flight Training Center

Implementation of Documentation Management System

By using

- System thinking
  - Training of personnel to better understand the interconnection of the system, e.g. identifying why and what we need, who may and when to assess the data
- Personal Mastery & Team learning
  - To encourage a more in-depth analysis and investigation of the data collect

Documentation Management System Framework



Implementation of Emergency Response Planning

By using

- Team learning & Building a Shared Version
  - Team building activities to build a more cohesive team
  - Comprehensive Emergency Response Handbooks/Procedure Manuals
- Mental Model
  - Involvement of all stakeholders and sub-contractors in the emergency response planning meeting

Hazard Identification and Risk Assessment and Mitigation

Using

- System Thinking
  - By a systematic way of processing our risk assessment and mitigation, e.g. the service scope
- Team Learning & Building a Shared Vision
  - Scheduling of action group meetings
- Mental Model
  - As part of the risk management team, to encourage open-mindedness, being able to see the others' mental pictures

Risk Assessment

General

- Hazard: Building Fire/Smoke
- Sub-Hazard: N/A

Risks	Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Injury and damage to buildings/equipments	3	Major	3	Remote	9	Acceptable with mitigation

- Current - Control Activities
  - Service and maintenance of the building fire extinguishing equipment by vendors

- Proposed Control Activities
  - Ensuring strict adherence of Servicing and Maintenance schedule
  - Introduction of Bi-annual Evacuation drills
  - Evacuation and Escape route packages online and by posters in briefing rooms

Risks	Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Injury and damage to buildings/equipments	2	Minor	2	Improbable	4	Acceptable

Risk Assessment

- Ground School/Simulator
- Hazard 1: Training/Checking Quality
- Sub-Hazard:
  - Poor trainee Technical performance
  - Poor trainee human factor skills
  - Incorrect usage of checklist
- Current - Control Activities: N/A

Risks	Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Hard landing on A/C training	4	Hazardous	3	Remote	12	Acceptable with mitigation
2. Miscommunication with ATC during A/C training resulting airmiss	3	Major	2	Improbable	6	Acceptable with mitigation
3. Runway/taxiway incursion or excursion during A/C training	4	Hazardous	3	Remote	12	Acceptable with mitigation

Risk Assessment

- Ground School/Simulator (cont.)
- Hazard 1: Training/Checking Quality
- Proposed- Control Activities
  - Stringent Selection of Suitable Instructors
  - Increase participation in upgrading courses
  - Trainee feedback system and Regular auditing
  - Regular performance review of instructors

Risks	Post Control Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Hard landing on A/C training	3	Major	2	Improbable	6	Acceptable with mitigation
2. Miscommunication with ATC during A/C training resulting airmiss	2	Minor	2	Improbable	4	Acceptable
3. Runway/taxiway incursion or excursion during A/C training	3	Major	2	Improbable	6	Acceptable with mitigation

Risk Assessment

- Ground School/Simulator
- Hazard 2: Machine/Computer Failure
- Sub-Hazard:
  - Fire/Smoke
  - Simulator collapse
- Current - Control Activities: N/A

Risks	Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Injury and Damage to Buildings/Equipments	3	Major	3	Remote	9	Acceptable with mitigation
2. Data loss	2	Minor	2	Improbable	4	Acceptable

Risk Assessment

- Ground School/Simulator (cont.)
- Hazard 2: Machine/Computer Failure
- Proposed Control Activities:
  - Regular servicing and maintenance of the Machine/computer
  - Backup system

Risks	Post Control Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Injury and Damage to Buildings/Equipments	2	Minor	2	Improbable	4	Acceptable
2. Data loss	2	Minor	2	Improbable	4	Acceptable

Risk Assessment

- Aircraft Training
- Hazard 1: Low Altitude Flying
- Sub-Hazard:
  - Terrain/ obstacles
  - Non-radar environment
- Current - Control Activities: N/A

Risks	Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Loss of Minimum terrain clearance	4	Hazardous	2	Improbable	8	Acceptable with mitigation
2. Loss of position	3	Major	2	Improbable	6	Acceptable with mitigation

Risk Assessment

- Aircraft Training (cont.)
- Hazard 1: Low Altitude Flying
- Proposed Control Activities:
  - Use an airport without high terrain in the vicinity
  - Enhance GPWS for trainees and instructors
  - Simulator section for familiarization prior to A/C training

Risks	Post Control Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Loss of Minimum terrain clearance	4	Hazardous	2	Improbable	8	Acceptable with mitigation
2. Loss of position	3	Major	2	Improbable	6	Acceptable with mitigation

Risk Assessment

- Aircraft Training (cont.)
- Hazard 2: Trainees' Low Experience Level
- Sub-Hazard:
  - Weak trainee performance
  - Poor communication
- Current - Control Activities: N/A

Risks	Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Hard landing	4	Hazardous	3	Remote	12	Acceptable with mitigation
2. Miscommunication with ATC resulting airmiss due to high workload (instructors)	3	Major	2	Improbable	6	Acceptable with mitigation
3. Runway/taxiway incursion or excursion	4	Hazardous	3	Remote	12	Acceptable with mitigation

Risk Assessment

- Aircraft Training (cont.)
- Hazard 2: Trainees' Low Experience Level
- Proposed Control Activities:
  - Enhance landing training in the simulator prior to the A/C training
  - To reduce workload, limit the number of trainees per section and use a abbreviated normal checklist
  - Hightlight in the pre-flight briefing

Risks	Post Control Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Hard landing	3	Major	2	Improbable	6	Acceptable with mitigation
2. Miscommunication with ATC resulting airmiss due to high workload (instructors)	2	Minor	2	Improbable	4	Acceptable
3. Runway/taxiway incursion or excursion	3	Major	2	Improbable	6	Acceptable with mitigation

Risk Assessment

- Aircraft Training (cont.)
- Hazard 3: Aircraft Emergency
- Sub-Hazard: N/A
- Current - Control Activities: N/A

Risks	Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Injury and Damage to buildings/equipments/A/C	3	Major	3	Remote	9	Acceptable with mitigation

- Proposed Control Activites
  - More significant emergency situation excersices to be included in the pre aircraft simulator detail

Risks	Post Control Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Injury and Damage to buildings/equipments/A/C	3	Major	2	Improbable	6	Acceptable with mitigation

Risk Assessment

- Aircraft Training (cont.)
- Hazard 4: Poor Weather
- Sub-Hazard:
  - Low visibility
  - Difficult to Departure/Landing
  - High workload
  - Deviation from trac
- Current - Control Activities: N/A

Risks	Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Loss of control in flight	4	Hazardous	2	Improbable	8	Acceptable with mitigation
2. Near miss	3	Major	2	Improbable	6	Acceptable with mitigation
3. Terrain contact	4	Hazardous	2	Improbable	8	Acceptable with mitigation

Risk Assessment

- **Aircraft Training (cont.)**
- **Hazard 4: Poor Weather**
- **Proposed Control Activities:**
  - **Delay or cancel the flight**

Risks	Post Control Risk Assessment					
	Severity		Probability		Risk Index	Torerability
1. Loss of control in flight	3	Major	2	Improbable	6	Acceptable with mitigation
2. Near miss	3	Major	2	Improbable	6	Acceptable with mitigation
3. Terrain contact	4	Hazardous	2	Improbable	8	Acceptable with mitigation

Risk Control/Feedback Management

- Regular trainee/instructor meeting
- Introduce and promote the voluntary report system
- Internal auditing system
- Trainee/instructor feedback system

- Risk Control

Risk Torerablity	Before	After
Acceptable	1	4
Acceptable with mitigation	14	11

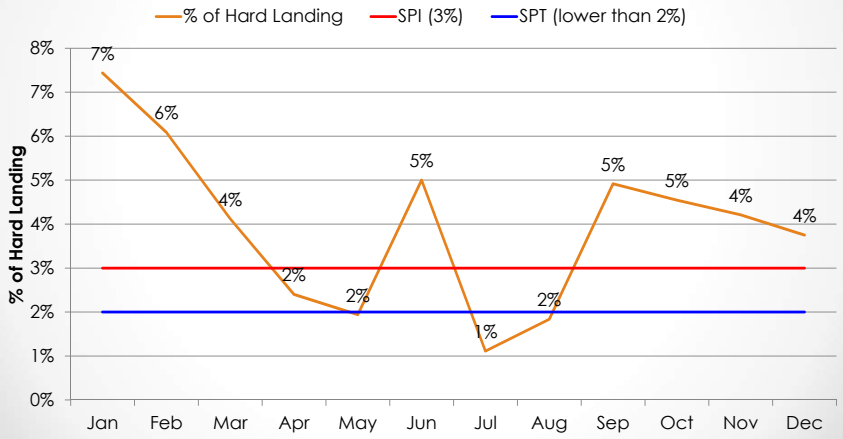
Safety Assurance

- Using by
  - Personal Mastery
    - Auditing skills proficiency
    - Reward system policy
  - System Thinking
    - Integration of overall systems
  - Mental Model
    - Implement feedback system
  - Team Learning

- The Management of Change – Identification of new hazards
- Continuous Improvement of the SMS – Using feedback loop
- Safety Performance Monitoring and Measurement
  - SPI & SPT, e.g. Hard landing incidents rate,
  - Quality assurance, e.g. internal and external audit

Based on previous company's 2013 data and industry research .

Target (SPT) is set for a 6 monthly period.



Safety Promotion

- Training and education
  - Dissemination of the SMS Manual
  - Safety processes and procedures incorporated in initial and any recurrent training
- Safety communication
  - Safety campaign, safety day
  - Safety newsletters, notices and bulletins (semi-annual Safety Newsletter)
  - Websites, posters, magazines or emails
  - SMS promotion in meetings
  - Feedback systems

Safety Promotion

By using

- Team Learning
- System Thinking
  - Integration of overall systems
- Personal Mastery
  - To motivate and improve the proficiency of instructors
- Mental Model
  - Key personnel trained in external courses
- Building a Shared Vision
  - Bulletin publishing
  - Regular instructor/ management meetings

Summary

Summary
SFTC Safety Case

- **By using the Senge 5th Discipline**
  - **Achieve a better dissemination of the SMS in our organization**
  - **Promotes an attitude of striving to attain higher safety standards by understanding the concept of Personal Mastery**
  - **Team synergy will have better tangible and intangible benefits by having a shared vision through Team Learning**
  - **Having a "big picture" understanding of the various divisions with the Mental Model discipline**
  - **Processes and procedures will be better understood and confusions avoided with the System Thinking concept.**

Thank You

附錄四：出國報告簡報

新加坡IATA 進階安全管理體制班

Advanced SMS for Civil Aviation

出國報告

航務處 蕭力文

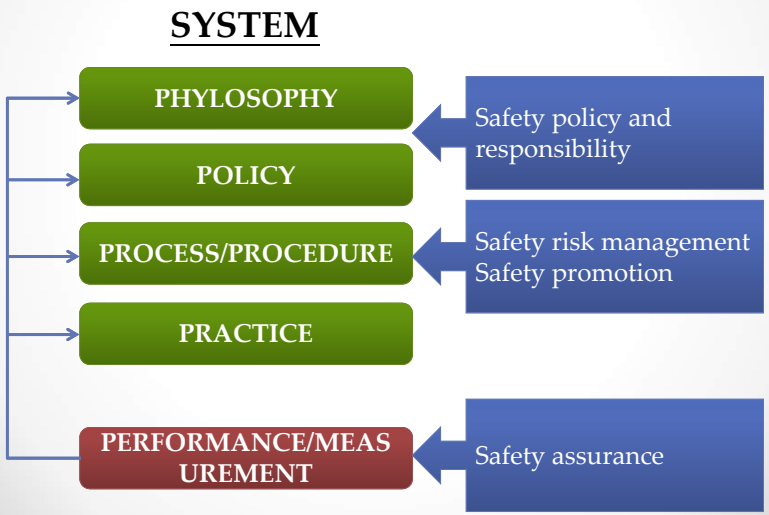
Course Schedule

7-11 July 2014

- SMS Concepts Updates
- Hazards and Risks
- Learning & Documents in SMS
- Culture and Human Factors
- Safety Assurance Issue

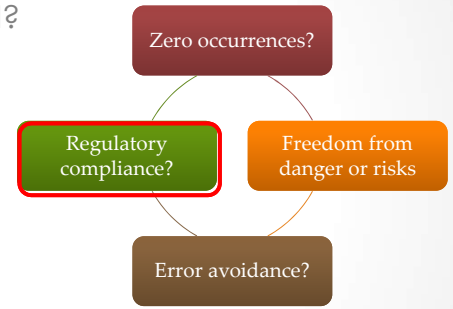
- Exercise
- Group Presentation
- Written Examination

How Does A System Work?



SMS Concepts Updates

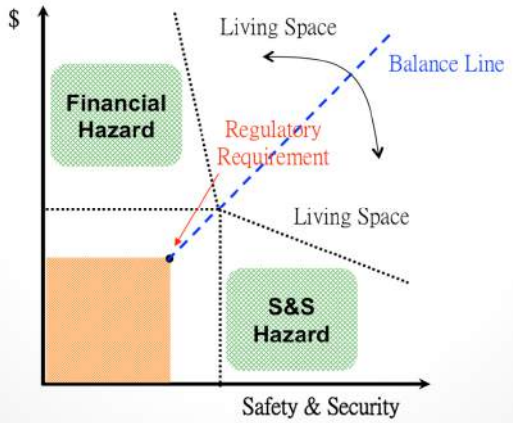
- How is Safety Defined?



- Safety (ICAO 9859 SMM)
  - The state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management.

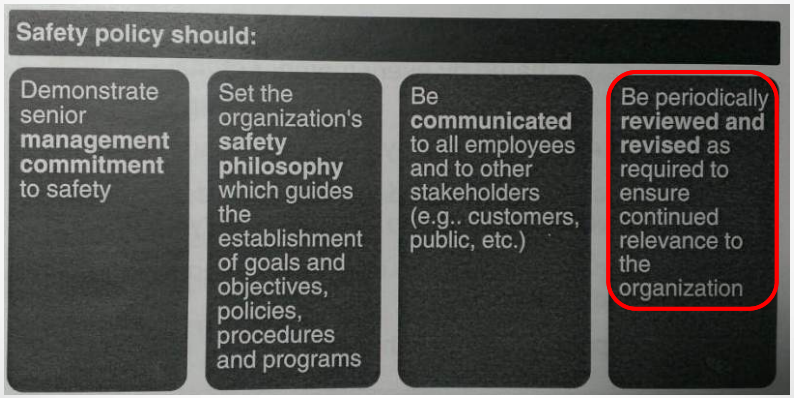
SMS Concepts Updates

- ALARP: **As low as reasonably practicable**



SMS Concepts Updates

- Safety Policy



Hazards and Risks

- Hazard
  A hazard in **an event or situation** that **could result in** damage or injury
- Risk
  Risk is the chance that a hazard will result in damage or harm
  It is measured in terms of consequences and likelihood

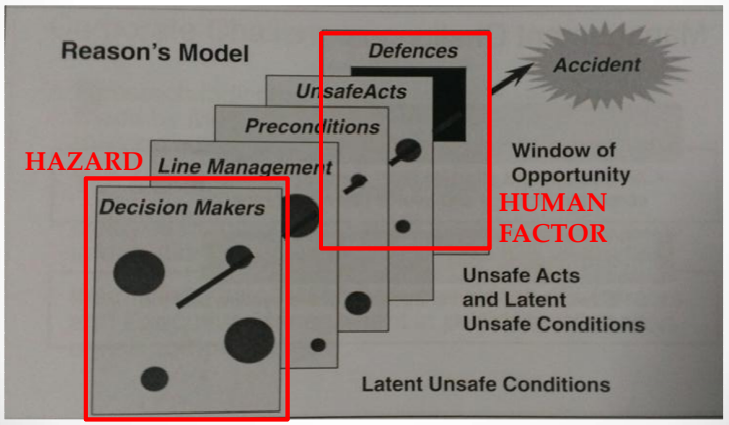
Not an outcome

- HAZID (Hazard Identification)
  - **Employees**
  - Incident/accident investigations, safety data collection and analysis
  - Analytical methods
  - **Human factors (deal with people)**
    - e.g. doctor and patient

Documentation

Hazards and Risks

- Swiss cheese model



Hazards and Risks

- Strategies

Reactive Method	Proactive method	Predictive Method
• The reactive method responds to the events that already happened, such as incidents and accidents	• The proactive method looks actively for the identification of safety risks through the analysis of the organization's activities	• The predictive method captures system performance as it happens in real-time normal operations

How can you encourage people to use the confidential reporting systems?

- Risk Reduction
  - severity?
  - Probability?

Hazards and Risks

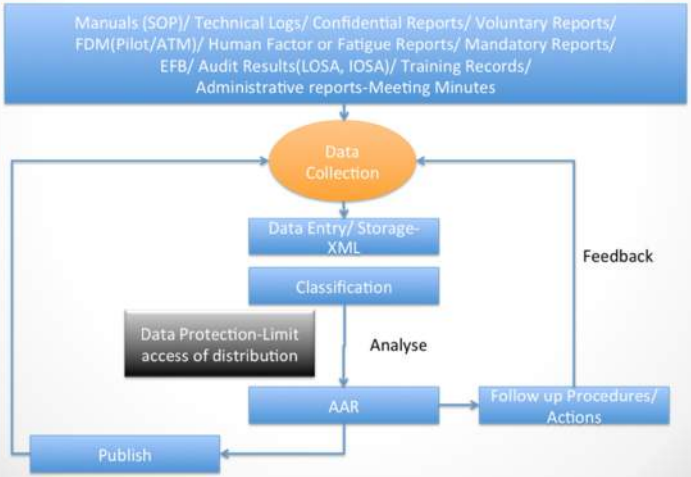
- Combines Hazards
  - e.g. pilot and flight plan
    - Weather
    - Scheduling
    - Fatigue
    - Crew complement/recency
    - Training
  - **Write processes**
  - **Make naturalistic**

Learning & Documents in SMS

- Individual learning
- Organizational Learning
  - The 5 disciplines – Senge
    - Personal Mastery
    - Mental Models
    - Shared Vision
    - Team Learning
    - System Thinking

Learning & Documents in SMS

- Documents in SMS – Integration



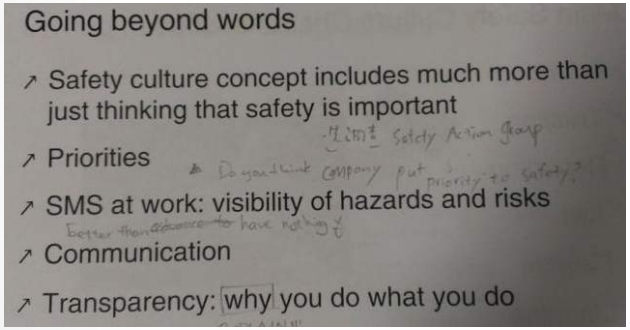
Culture and Human Factors

- Last frontier of human factor
- The development and maturing of a safety culture is essential **to reduce the human variability** in performance.
  - SOP
  - Explain WHY
- The Naturalistic Safety

- How can you improve your safety culture?
  - Know your culture: do a survey and analysis

Culture and Human Factors

- Going beyond words



- Group pressure

Safety Assurance

- SA components
  - Safety performance monitoring and measurement
  - Safety records
  - Management of change
    - **RM on organization's change**
  - Continuous improvement of SMS
    - **System assessment**
- KPI Dimensions

Personal Safety | Process Safety | Leading | Lagging

Comparison

	Lesson Learn	Our SMS
Safety Policy/Goals	Reviewed and revised	?
Hazards and Risks	HAZID: potential hazard data collection and analysis	Data collection
Learning & Documents in SMS	Integration of SMS data flow	Individual data base
Culture and Human Factors	Survey and auditing	X
Safety Assurance	**Change management** System assessment Leading/Lagging KPI	◎ X Lagging KPI

IATA

Certificate

This is to certify that

Hsiao Li-Wen

has passed with distinction the course

Advanced Safety Management Systems (SMS) in Civil Aviation (Classroom, 5 days)

given by the IATA Training & Development Institute

Singapore, Singapore
7 July 2014 - 11 July 2014

Tony Tyler
Director General and CEO

IATA Training & Development Institute

KNOWLEDGE • EXPERIENCE • NETWORKING • SKILLS • RESULTS

THANK YOU